UNIT 1

Lesson Three

Main Groups in the Modern Periodic Table

Worksheet 7

1. A. Write the scientific term :

1. A group of metals which react strongly with water forming alkaline solutions. (.....)
2. A substance which kept under its surface most alkali metals. (.....)

B. Choose the correct answer :

1. Elements which have atomic numbers ..... are called alkali metals.
   a. 2 , 8 , 16 b. 2 , 10 , 18 c. 3 , 11 , 19 d. 4 , 12 , 20
2. Alkali metals have all the following properties, except .....
   a. they have low density. b. they conduct electricity.
   c. they conduct heat. d. they don't react with water.
3. When sodium reacts with water, ... gas evolves. *(Akhnaton Sch. / Cairo 2020)*
   a. O_2 b. CO_2 c. H_2 d. NO_2
4. Most ..... are kept under the surface of kerosene in the lab.
   a. alkali metals b. halogens c. inert gases d. alkaline Earth metals
5. The most active element in group (1A) is ..... *(Akhnaton Sch. / Cairo 2020)*
   a. Na b. Cs c. K d. Li

2. Give reasons for :

1. Elements of group (1A) are known as alkali metals. *(Essamt Sch. / Alexandria 2020)*

   .....

2. Sodium is kept under the surface of kerosene.

   .....

3. Rubidium and cesium elements sink in water.

   .....

4. The reaction of potassium with water is stronger than that of sodium.

   .....

   .....

3. Complete the following statements :

1. Lithium element ..... on water surface, as its density is ..... than that of water.
2. During the chemical reactions, sodium tends to ..... an electron and changes into ..... ion which carries ..... positive charge.
3. Potassium reacts with water giving ..... and ..... gas evolves.
4. The chemical activity of alkali metals increases as the ..... increases.

4. The opposite figure represents group (1A) of the periodic table.

Answer the following questions :

1. The element which has the electronic configuration (2, 8, 8, 1) is .....
2. The most metallic element is .....
3. Elements which float on the water surface are .....
4. The least metallic element is .....

A
B
C
D
E

[NB. The letters don't represent the actual symbols of elements]

Worksheet 8

1. A. Complete the following :

1. Halogens locate in group ..... *(Al Bayan Lang. Sch. / Cairo 2023)*
2. Halogens which exist in gaseous state includes ..... , ... *(Leaders Sch. Alexandria 2020)*
3. We use ..... to preserve food as it emits gamma rays.
4. Silicon is used in manufacture of ....., while liquefied nitrogen is used in .....

B. Write the scientific term :

1. The halogen which exists in a liquid state. *(El-Menofia 2020)* (.....)
2. Rays which are emitted from radioactive cobalt 60. (.....)

2. A. Which of the following elements ($_{11}X$) , ($_{17}Y$) and ($_{14}Z$) :

1. Can replace iodine in potassium iodide solution : .....
2. Used in the manufacture of electronic slides : .....
3. Can react together and form salt : .....

B. Mention one use for each of the following :

1. Liquid sodium : ..... *(Aswan 2020)*

2. The radioactive cobalt 60 : .....*(Essmat Sch. / Alexandria 2020)*

3. A. Put (✓) or (✗), then correct what is wrong :

1. Halogens are monovalent elements.

( ) .....

2. Boiling point of liquefied nitrogen is (–196°C).

( ) .....

3. Bromine is a halogen which exists in a solid state.

( ) .....

B. Give reasons for :

1. Halogens are not exist in nature in elementary state.

.....

2. Halogens are called by this name. *(Qena 2020)*

.....

3. Liquefied nitrogen is used in cornea preservation. *(Science Inspectorate / El-Sharkia 2023)*

.....

4. A. Complete the following equations :

1. $Br_2 + NaCl \longrightarrow$ .....

2. $Cl_2 + 2KI \longrightarrow$ ..... + ...

3. $2K + Br_2 \longrightarrow$ .....

B. Choose the odd word out, then mention the scientific term for the rest :

1. Potassium / Iodine / Fluorine / Astatine / Bromine.

2. Fluorine / Chlorine / Oxygen / Hydrogen / Sodium.

.....

.....

Worksheet 9 on Lessons One, Two & Three Unit 1

1. A. Complete the following statements :

1. ..... is a radioactive element.
2. Halogens mean .....
3. Both of ..... and ..... are examples of acidic oxides.
4. Elements of the same ..... are similar in the number of electrons in the outermost energy level.

B. Write the scientific term of each of the following :

1. The metalliod which is used in the manufacture of electronic devices.
(Borg El-Arab Zone. / Alexandria 2020) (.....)
2. The halogen which exists in a solid state.
(Borg El-Arab Zone. / Alexandria 2020) (.....)

2. A. Correct the underlined words :

1. Liquefied nitrogen is used in **food preservation**. (.....)
2. Halogens exist in the form of **monoatomic** molecules. (.....)
3. Transition elements lie in **s-block**. *(El-Menofia 2020)* (.....)

B. Give reasons for :

1. Potassium is more active than sodium. *(Manaret Sch. / Cairo 2020)*
.....
.....
2. Iodine can't replace bromine in its salt solution.
.....
.....

3. A. Choose the odd word (or symbol) out :

1. SO_2 / MgO / Na_2O / CaO
.....
2. Fluorine / Chlorine / Iodine. *(West Fayoum Zone / Fayoum 2023)*
.....
3. Sodium / Magnesium / Aluminium / Sulphur.
.....

B. What happens when ... ?

1. Increasing the atomic number in period 1 (Concerning the atomic size).

.....

2. Putting a piece of potassium in a beaker containing paraffin oil.

.....

4. A. Choose the correct answer :

1. ..... is used in food preservation.

a. Sodium b. Cobalt 60 c. Silicon d. Liquefied nitrogen

2. Carbon dioxide reacts with water forming .....

a. H_2CO_3 b. HCl c. HNO_3 d. H_2SO_4

3. Al_2O_3 is known as .....

a. acidic oxide. b. basic oxide.

c. amphoteric oxide. d. alkaline oxide.

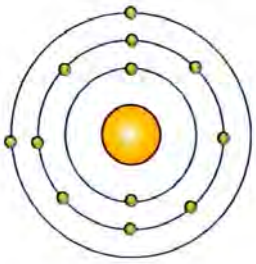
4. The electronic configuration of the ion of potassium ($_{19}K$) element is similar to the electronic configuration of the atom of ..... element.

a. $_{11}Na$ b. $_{10}Ne$ c. $_{18}Ar$ d. $_{15}P$

5. The electronic configuration of neon atom ($_{10}Ne$) is similar to that of the ions of all the following atoms, except .....

a. $_{9}F$ b. $_{8}O$ c. $_{7}N$ d. $_{16}S$

B. The opposite figure represents the electronic configuration of element (X) that presents in the modern periodic table :



1. Determine :

a. The location of the element : .....

b. The block to which this element belongs to : .....

2. Conclude the atomic number of :

a. element (Y) that follows it in the same period :

.....

.....

b. element (Z) that follows it in the same group :

.....

.....

UNIT 1

Lesson Four

Water

Worksheet 10

1. A. Choose the correct answer :

1. All of the following are from water properties except .....
   a. it exists in three states.
   b. it has high boiling point.
   c. its density decreases on freezing.
   d. it is a non-polar compound.
2. Water molecule consists of .....
   a. two atoms of three different elements.
   b. three atoms of two different elements.
   c. three atoms of three different elements.
   d. four atoms of two different elements.

B. What is the importance of Hofmann's voltameter ? *(South Sinai 2020)*

.....

2. A. Complete the following statements :

1. Water is considered as a good ..... solvent, as it dissolves most .....compounds.
2. The density of water in ..... state is lower than its density in ..... state.
3. Water molecule consists of ..... atoms and ..... atom.
4. The bond between water molecules is called ..... bond. *(Akhnaton Sch. / Cairo 2020)*
5. Increasing the boiling point of water is due to the presence of .....

B. What is meant by hydrogen bond ?

.....

.....

3. A. What happens when ... ?

The temperature of water decreases below 4°C.

.....

.....

B. Put (✓) or (✗), then correct what is wrong :

1. Table salt and sugar are from covalent compounds.

( ) .....

2. The angle between the two single covalent bonds in water molecule is 104.5°
( ) .....

3. Hydrogen bond is weaker than covalent bond.
( ) .....

4. A. Write the scientific term :

1. The bond between hydrogen atom and oxygen atom in water molecule.
(El-Gharbia 2020) (.....)

2. The type of bond which links the molecules of water together.
(Leaders Sch. / Alexandria 2020) (.....)

3. The positive pole of Hofmann's voltameter. (.....)

B. Give reasons for :

1. Ice floats on water surface.
.....

2. Adding drops of dilute acid to water during its electrolysis.
.....

3. The closed glass bottle filled with water is broken when it is put in freezer.
.....

4. Sugar dissolves in water although it is a non-polar compound. *(Essmat Sch. / Alexandria 2020)*
.....

5. Pure water doesn't effect on both of litmus paper.
.....

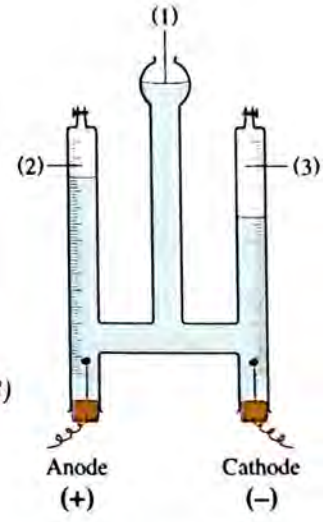
C. From the opposite figure , answer the following questions : *(Lycee El-Haram Sch. / Giza 2020)*

1. What is the name of this apparatus?
.....

2. Label the numbers (1) , (2) and (3).
(1) ..... (2) ..... (3) .....

3. What happens if a glowing splint is put above the anode and the cathode?
* Above the anode, ...
* Above the cathode, ...

4. Write the balanced equation of this process.
(Science Inspectorate / Qena 2023)
.....



5. Calculate the volume of the gas that evolves at the anode, if the volume of the gas that evolves at the cathode is 20 cm^3.
(Heliopolis Modern Lang. Sch. / Cairo 2022)
.....

Worksheet 11

1. Explain what happens when ... ?

1. Storing the tap water in empty plastic bottles.

.....

.....

2. Water is mixid with the wastes of man and animal. *(Borg El-Arab Zone. / Alexandria 2020)*

.....

.....

2. Complete the following :

1. Mixing of animals and human wastes with water leading to the infection with many diseases such as ..... , ... and .....
2. Increasing the mercury concentration in drinking water causes ..... , while increasing arsenic concentration in it, increases the infection rate of .....
3. We must ..... the drinking water tanks and don't store the tap water in ..... bottles.
4. Eating fish contain high concentration of lead causes the .....

(Amoun Lang. Sch. / Cairo 2023)

5. The nuclear reactors cause both ..... and ..... pollution for water. *(El-Menofia 2020)*

3. A. 1. Nuclear reactors cause thermal water pollution and radiant water pollution. Explain.

.....

.....

.....

.....

2. How to protect water from pollution ? (Two points only).

.....

.....

B. Write the scientific term :

1. A kind of water pollution which results from mixing of humans and animals wastes with water. *(Badr Lang. Sch. / Cairo 2023)* (.....)
2. A kind of water pollution which results from discharging factories wastes and sewage in rivers and seas. (.....)
3. A water pollutant which causes the death of brain cells.

(El-Menofia 2020) (.....)

4. **A. What is meant by water pollution ?** *(Port Said 2020)*

.....

.....

B. Put (✓) or (✗), then correct what is wrong :

1. Volcanic eruptions and lightning accompanied by thunder storms are from artificial environmental pollutants.

( ) .....

2. Adding of chemical fertilizers to water causes water pollution.

( ) .....

3. Storing the tap water in plastic bottles causes the increase of infection with hepatitis.

( ) .....

November Tests

Model 1

Total mark: 10

Question 1 — 5 marks

A Choose the correct answer :

1. Pilots prefer to fly their planes in the lower part of ..... , because there are no weather disturbance and air moves horizontally.
   a. thermosphere b. mesosphere c. troposphere d. stratosphere
2. There are ..... bonds among water molecules.
   a. hydrogen b. covalent c. ionic d. metallic
3. ..... radiation is characterized by thermal effect.
   a. Infared b. Ultraviolet c. Visible light d. X-ray
4. Ionosphere layer is located in the upper part of ..... layer.
   a. stratosphere b. troposphere c. mesosphere d. thermosphere

B Give a reason for the following :

The abnormality of water is high.

.....

.....

Question 2 — 5 marks

A Put (✓) or (✗) :

1. Methyl bromide gas is used as an insecticide. ( )
2. The ozone layer allows the passage of all near and medium ultraviolet rays. ( )
3. Water density increases on freezing. ( )
4. Wind moves from regions of high atmospheric pressure to that of low atmospheric pressure. ( )

B What happens when ... ?

Increasing in the percentage of nitrogen oxides in the atmospheric envelope.

.....

.....

Model 2

Total mark
10

Question 1 5 marks

A Write the scientific term of each of the following :

1. The positive pole in Hofmann's Voltameter. (.....)
2. The phenomenon that appears due to scattering of harmful charged radiations by Van-Allen Belts. (.....)
3. A chemical compound used as a cooling material in air conditioning sets and refrigerators. (.....)
4. The barometer used by pilots in aeroplanes to measure their elevations above the sea level. (.....)

B Give a reason for the following :

The atmospheric pressure decreases on going above the sea level.

.....

.....

.....

Question 2 5 marks

A Complete the following statements :

1. Troposphere contains about ..... % from atmospheric envelope mass and about ..... % from atmospheric water vapour.
2. The erosion of ozone layer above the ..... pole increases in the month of ..... every year.
3. The density of air at the top of a mountain is ..... than the density of air at the sea level.
4. Increasing the mercury concentration in drinking water causes ..... , while increasing arsenic concentration in it, increases the infection rate by .....

B What happens when ..... ?

Storing water in plastic bottles of mineral water.

.....

.....

.....

Test 1

Total mark
10

Question 1

(5 marks)

A Put (✔) or (✘) :

1 Lithium is the most active metal in group (1A). ( )

2 Liquefied nitrogen is used in the preservation of cornea of the eye. ( )

3 Water density increases on freezing. ( )

4 Hofmann's voltameter is used for the electrolysis of acidified water. ( )

B Give a reason for the following :

Elements of group (7A) are known as halogens.

.....

.....

Question 2

(5 marks)

A Choose the correct answer :

1 The strongest metal lies in group .....

ⓐ 1A ⓑ 2A ⓒ 6A ⓓ 7A

2 The outermost energy level of any halogen contains ..... electrons.

ⓐ 1 ⓑ 2 ⓒ 6 ⓓ 7

3 There are ..... bonds among water molecules.

ⓐ ionic ⓑ hydrogen ⓒ covalent ⓓ metallic

4 The volume of hydrogen gas evolving from acidified water electrolysis equals ..... the oxygen volume.

ⓐ four times ⓑ half ⓒ twice ⓓ three times

B What happens if ... ?

Water is polluted with arsenic.

.....

.....

Test 2

Total mark
10

Question 1

(5 marks)

A Write the scientific term of each of the following :

1 The halogen which exists in a solid state. (.....)

2 The metalloid which is used in the manufacture of electronic devices. (.....)

3 A type of weak electrostatic attraction which arises among molecules of some polar compounds. (.....)

4 Water pollutant which causes the death of brain cells. (.....)

B What happens if ... ?

Sodium reacts with water.

.....

.....

Question 2

(5 marks)

A Complete the following sentences :

1 Rubidium and cesium ..... in water as their densities are ..... than water density.

2 Chlorine can replace ..... and ..... in their salt solutions.

3 Pure water boils at ..... °C and freezes at ..... °C.

4 The bond between hydrogen atom and oxygen atom in a water molecule is ..... bond, while bonds among water molecules are ..... bonds.

B Give a reason for :

Although sugar is a covalent compound, it dissolves in water.

.....

.....

Answers of Test 1

Question 1

A
1 (✘)
2 (✔)
3 (✘)
4 (✔)

B Because they react with metals forming salts.

Question 2

A
1 (a)
2 (d)
3 (b)
4 (c)

B The infection rate by liver cancer increases.

Answers of Test 2

Question 1

A
1 Iodine.
2 Silicon.
3 Hydrogen bonds.
4 Lead.

B Hydrogen gas evolves which burns with a pop sound.

Question 2

A
1 sink – higher
2 bromine – iodine
3 100 – 0
4 covalent – hydrogen

B Because sugar molecules can form hydrogen bonds with water molecules.

Science prep.2 **November revision 2022-2023**

Q.1 :Write the scientific term

1. The most active metal . [ ]
2. A gas that is used in cornea preservation . [ ]
3. Non- metal elements are not exist in nature in elementary state .]
4. The element which has the largest atomic size . [ ]
5. Group of elements react with water forming alkaline solution [ ]
6. bond responsible for the abnormal property of water molecules .[ ]
7. A kind of water pollution results from discharging of factories residues [ ]
8. The angle between the two covalent bonds in water .[ ]
9. The bond which links the molecules of water . [ ]
10. Pollution causes rises in water temperature [ ]
11. An element used in liquid state inside nuclear reactor [ ]
12. An instrument used in water electrolysis [ ]
13. An element used in the preservation of cornea of eye [ ]
14. A positive pole in Hoffman voltameter [ ]
15. A kind of water pollution resulted from human activites [ ]
16. The addition of any substance to water that causes change in water properties and affect on living organisms health [ ]
17. An element used in food preservation [ ]
18. A water pollutants that causes death of brain cells [ ]
19. A gas which evolves at cathode during water electrolysis[ ]
20. A halogen in liquid state [ ]
21. A kind of ions which are formed by alkali metals during chemical reactions [ ]

Q.2Complete the following

1. ……. used to transfer the energy from inside the reactor to outside
2. The chemical activity of alkali metal ……as the .....increases
3. ……emits……rays which prevent the reproduction of microbial cells .
4. As the atomic number increases in group " 1 A" , the atomic size .....,
5. the metallic property ……when the electro negativity ……
6. Lithium element ……in water as its density .....than that of water .
7. Alkaline metals react with water to produce .....gas .
8. Metal oxides are called …….while non – metals oxides are called……
9. is used in the manufacture of electronic slides ……...
10. Valency of group 1A is ……while group 18 is …….
11. water molecules consist of ……atoms and … ..…..atom
12. The density of water in ……state is lower than its density in .....state
13. The hydrogen bond is ……than covalent bond
14. …….is a good polar solvent.
15. the bond between hydrogen atom and oxygen atom in water is ……
16. Water has .....boiling point .
17. …….is the positive pole of Hoffman's voltmeter .
18. Water has .....effect on litmus solution .
19. Mixing of animals and human wastes with water leading to the infection by many diseases such as ……and …….
20. ……is a kind of water pollution results from mixing of humans and animals wastes with water .
21. ……..and.....are from water pollutants .
22. water is considered as a good .....solvent .
23. In Hoffman voltameter oxygen gas evolved at ……

Q.3 Give reason for :

1-the metals of group (1A) are called alkali metals.

……

……

2- Although Hydrogen gas exists in group (1A) it is a non-metal.

……..

3- Some of alkali metals are kept under kerosene or paraffin.

……..

4- Lithium is kept under Paraffin not kerosene.

……..

5- Alkali metals are monovalent elements.

……..

6- elements of group (17) are called Halogens.

……

……

7- Chlorine is used in the manufacture of correction substances.

……

8- elements of group (17) are monovalent elements.

……

9- elements of group 17 don't exist individually.

……..

10- Sodium is used in its liquid state as it is a good conductor of heat.

……

11- Silicon slides are used in the manufactures of computers.

……

12- Liquified Nitrogen is used in the preservation of cornea.

……

13- the radioactive cobalt is used in food preservation.

……

14- -A weak electrostatic attraction originated between water molecules which are called hydrogen bonds.

……..

15- the abnormality of water properties.

……

16- water is a unique substance.

……

17- Rising of the boiling point of water.

……..

18- the density of water when it is in solid state is lower than when it is a liquid state.

……

……

……..

19- Swimming in the sea is easier than swimming in the pole.

……

20- Water is neutral liquid.

……

21-Mixing human and animal wastes of water cause many diseases.

……..

22-water which used in the cooling of the nuclear reactors destroys the marine organisms found in it.

……

……

Q.4:What is the importance of? :

1. Silicon

……

2. Sodium

……

3. Liquefied Nitrogen

……

4. Cobalt 60

……..

5. Hydrogen bonds in water.

……..

6. Hoffman voltameter device

……..

Q.5:What happens by adding :

7. Chlorine to sodium bromide ……

2. potassium to bromine ,……..

Q.6 :What's meant by :

1. Hydrogen bond :

……

2. Water pollution :

……

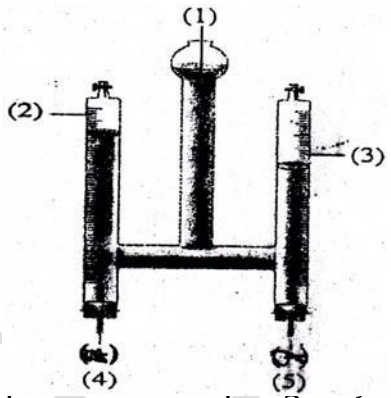
3.Halogens :

……

4. chemical pollution

……

Q.7From the opposite figure , answer the following questions :-



1. What is the name of this apparatus? ……
2. Label the numbers (1) , (2) , (3) , (4) and (5) .
3. What happens if a glowing splint is put abovethe anode and the cathode ?

……

……....

4. Calculate the volume of the gas that evolves at cathode if the gas at anode =2cm^3

……

Q.8:From the opposite fig. answer the following questions

1- what is the name of this group ?

……..

2- what is the valency of the elements of this group?

……

3- what is the importance of element (Y)

……

Q.9: Study the following elements then answer the following questions

1- which element react strongly with water $(_{11}X), (_{17}Y), (_{14}Z).$

……

2- Which element can replace iodine in potassium iodide solution

……

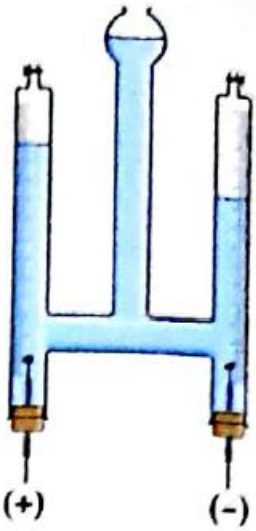
3- Enter in the manufacture of electronic slides

……..

4- Choose two elements when they react together, they form a salts

……

Q.10 the opposite fig. represent Hoffman voltameter answer the following questions



1- Write the chemical equation that represent the reaction

……

2- What is the volume of gas which burn with a pop sound

If the volume of the other gas =10 cm^3 ?

……

3- What is the name of the collected gas at anode and cathode?

……

4- What is the importance of this apparatus?

……

Q.11: Look at the following elements then answer the following questions

1- What is the type of this water pollution?

……

2- What happen if there is increasing in the ratio of :

A) arsenic element ……

B) Lead element ……

Q.12 :answer the following questions

1-arrange the following elements :

a) Ascendingly according to the degree of chemical activity

(Sodium – Rabidium – Lithium – Cesium)

b) Ascendingly according to the density :

(Na - K – Li – Rb – Cs)

Q.13: Study the following table then answer the following questions

A																	
C												Z	B	J			
X												L		K	D		
	R					M											
E																	

1- What is the kinds of elements (X) - (M) – (D)

……

2- Mention the element which represent :

a) The most active element in group 1A

……

b) Halogen element

……

c) Inert gas

……..

d) The element that has the largest atomic size

……..

Q.14 :Look at the following elements then answer the following questions

1- What is the type of this water pollution?

……

2- What is the name of diseases that is caused by this type of water pollution?

……..

3- Mention two methods of water protection

……

Answers

Q.1 :Write the scientific term

1. Cesium
2. Liquefied nitrogen
3. Halogens
4. Cesium
5. Alkali metals
6. Hydrogen bond
7. Chemical pollution
8. 104.5
9. **Hydrogen bond** .
10. Thermal pollution
11. Sodium
12. Hoffman voltameter
13. Liquefied nitrogen
14. Anode
15. Artificial pollution
16. Water pollution
17. Cobalt 60
18. Chemical pollution
19. Hydrogen
20. Bromine 21- positive ion

Q.2

1. Liquefied sodium
2. Increase – atomic size
3. Cobalt 60 – gamma rays

4. increase
5. decrease – increase
6. floats - less than
7. Hydrogen
8. Basic - Acidic
9. Silicon
10. Mono valent – zero
11. Two hydrogen – one oxygen
12. Solid – liquid
13. weaker
14. water
15. single covalent
16. high .
17. anode .
18. neutral .
19. Bilhazia – typhoid
20. Biological
21. Chemical and thermal
22. Polar
23. Anode

Q.3 Give reason for :

1-Because they react with water forming alkali solutions.

$2Na + 2H_2O \rightarrow 2NaOH + H_2$

2- Because its atom is remarkably small and it is a gaseous element.

3-To prevent their reaction with moist air.

4- Because it floats on the surface of kerosene and it is immediately burns.

5- Because they contains one electron in the outer most energy level.

6- Because they react with metals forming salts.

$2K + Br \quad KBr$

7- Because it is a very volatile liquid.

8- Because they gain one electron during the chemical reactions

9- Because they are chemically active.

10- Because it is used in the transferring heat from inside the nuclear reactor to outside.

11- Because they are semiconductors which their conductivity of electricity depends on the temperature.

12- Because it has a very low boiling point (-196° c).

13- Because it emits gamma rays which prevent the reproduction of microbial cells.

14- Due to the large electronegativity of oxygen compared with hydrogen.

15- Because of the presence of hydrogen bonds between its molecules.

16- Because its existence in the three states at the ordinary temperature.

17-Due to the presence of hydrogen bonds.

18-Because when it is in the temperature lower than 4 ° c, the water molecules are collected by hydrogen bonds forming hexagonal crystals with many spaces between them.

19- Because the density of salty water is higher than density of the fresh water.

20- Because when it is ionizes it gives equal numbers of positive hydrogen ions and negative hydroxide ions. (H+ = OH -).

21-Because it cause the biological pollution which makes (Bilharzia – typhoid – hepatitis)

22-because it rises the temperature of water

4- What is the importances of :

1. Used in the manufacture of electronic slides as computer and transistors
2. used to transfer heat energy from inside the reactor to outside
3. Used in preserving cornea of eye

4. Used in preserving food
5. bond responsible for the abnormal property of water molecules.
6. Used in water electrolysis

……..

5- What happens by adding :

1. Chlorine can replace bromine and sodium chloride is formed

$Cl + NaBr_2 \longrightarrow NaCl + Br_2$

2. potassium bromide salt is formed

$K + Br_2 \longrightarrow 2KBr$

6- What's meant by :

1. It is a type of electrostatic attraction that originates between the molecules of polar compounds
2. The addition of any substance to water that causes change in water properties and affect on living organisms health
3. Halogens they are non-metal elements located at the left side of periodic table before inert gases

4. A kind of water pollution resulted from discharging factories wastes and sewage in rivers ,seas and canals

Q.7:

1. Hoffman voltameter
2. (1) acidified water , (2) oxygen gas ,

(3)hydrogen gas , (4) anode (5) cathode .

3- Above the anode its glowing will increase

Above the cathode it will burn with pop sound

4. $4cm^3$

Q.8:

1. Alkali metals
2. mono valent
3. used to transfer heat energy from inside the reactor to outside

……

Q.9:

$(_{11}X), (_{17}Y), (_{14}Z).$

1- X
2- Y
3- Z
4- X and Y

……

Q.10

1. $2H_2O \xrightarrow[Dil.H_2SO_4]{Electrolysis} 2H_2 + O_2$

2 : 20 Cm^3

3- at anode oxygen - at cathode hydrogen ?

4-Analysis water into hydrogen and oxygen

……

Q.11:

1- chemical water pollution

2- A) arsenic element causes liver cancer

B) Lead element damage of brain cells

Q.12 :

1-

a) Lithium – sodium – rubidium – cesium

b) Li - K - Na - Rb - Cs

Q.13:

1- X) : Alkalil metal - (M) : transition – (D: inert gas)

2- Mention the element which represent :

a) E

b) J -K

c) D

e) E

……

Q.14 :

1- Biological water pollution

2-Bilharizia , typhoid and hepatitis

3- A) Prevention of getting rid of sewage and factories wastes in water

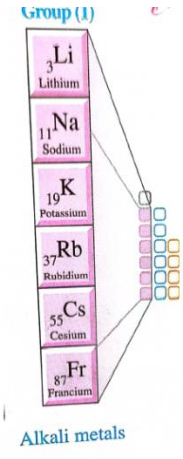
B) Disinfection of the dinking water tanks in a periodical manner

C) Don’t store tap water in empty plastic bottles

Lesson "3"

"Main group in modern periodic table"

1-Alkali metals group (group 1A) :



Alkali metals

Location : 1-It is located on the maximum left side of the modern periodic table .

2-It is the first group of s-block .

حفظ بالترتيب

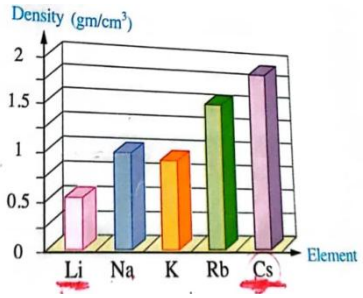
General properties of alkali metals :

Physical properties:

1-all of them are solids at ordinary temperature and they have metallic luster .
2-they are good conductors of heat and electricity .
3-most of them have low density.

Exercise :

Study the opposite figure which represent the density of alkali metals ,then determine :



1-the alkali metals which has the lowest density and which on has the highest density.
2-the elements that float and sink in water with explanation .

Answer

1- the lowest density alkali metals : lithium (Li) element .
- the highest density alkali metals : cesium (Cs) element
2-alkali that float on water surface : lithium (Li) , sodium (Na) , potassium (K) .
Explanation : because their densities are smaller than the density of water(1gm /cm$_3$)
-Alkali elements that sink in water : rubidium (RB) , Cesium (Cs).
Explanation : because their densities are greater than the density of water(1gm /cm$_3$)

Chemical properties :

1-their outermost energy level contains only one electron .
2-they are monovalent elements.
3-they are chemically active elements.
The are kept under the surface of kerosene or paraffin oil
4- there are chemically active increases as the atomic number increases

NB:

Alkali metals are kept under the surface of kerosene (except lithium which is kept under the surface of paraffin oil.

GR

1-Alkali meters are monovalent elements

Because they tend lose their valency (outermost)electron during the chemical reaction forming positive ions, each of them carries one positive charge.

2- alkali metals kept under the kerosene or paraffin oil.

To prevent their reactions with moist air.

3- chemical activity of alkali metals increases as the atomic number increases .

Due to increase if their atomic sizes, so they can lose valency electron easily.

4-cesium (cs) is the most active alkali metal in the periodic table .

Because it has the largest atomic size , so it can lose its valency electron easily.

==========

Reaction of Alkali metals with water

Conclusion : Each of sodium and potassium react with water forming alkali solution and hydrogen gas evolves.

$2Na + 2H_2o \rightarrow 2NaOH + H_2\uparrow$	$2K + 2H_2O \rightarrow 2KOH + H_2\uparrow$
Sodium water Sodium Hydroxide hydrogen gas	Potassium water potassium Hydroxide hydrogen gas

***the reaction of potassium with water is stronger than that of sodium, because potassium is more active than sodium size is larger than that of sodium.**

GR: 1-Elements of group (1A)in the periodic table are called alkali metals (alkaline metals).

Because they react with water forming alkaline solutions.

2-soudium fires are not put off with water

Because sodium reacts instantly with water and hydrogen gas evolves which burns with a pop sound by the effect of heat of the reaction .

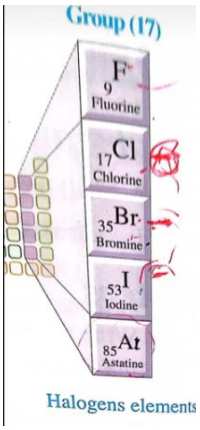
$2Na + 2H_2o \rightarrow 2NaOH + H_2\uparrow$

2-Halogens group (group 7A)

LOCATION :.

***It is located on the right side of the modern periodic table**

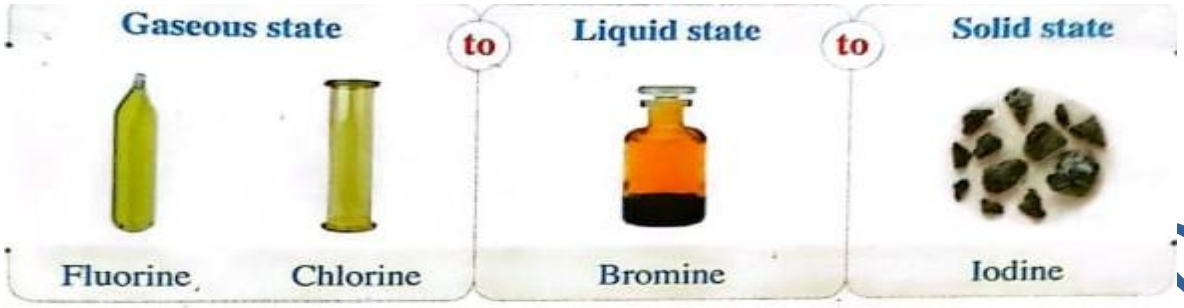
***it is one of the group of p-block**



*General properties of halogens:

A) physical properties: 1-they are bad conductors of heat and electricity .

2- they physical state is graduated from :



B)Chemical properties :

1-their outermost energy level contains 7 electrons.

2-they are monovalent elements GR

Because they tend to gain one electron only during the chemical reaction forming negative ions each of them carries one negative charge.

$M + e \rightarrow M^-$

Nonmetal "halogen" + electron → negative ion

3- they are chemical active elements , therefore they do not exist individually in nature but they exist in chemical compounds (except Astatine (At) which is prepared artificially)

4-they exist in the from of diatomic molecules (formed of two atoms).

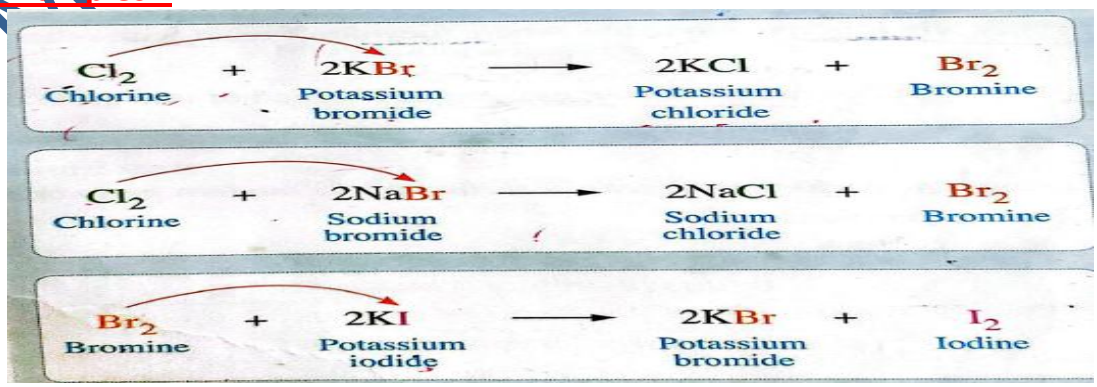
Element	Fluorine	Chlorine	bromine	Iodine
Formula of molecule	F_2	Cl_2	Br_2	I_2

5-they react with metals forming salts so, they are called halogens , which mean " salts formations"

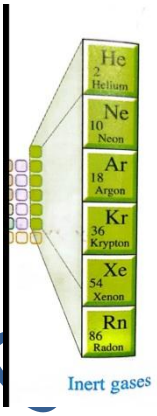
$2K + Br_2 \rightarrow 2KBr$ **Potassium bromide** — **bromine** — **potassium bromide**
$2Na + Cl_2 \rightarrow 2NaCl$ **Sodium** — **chlorine** — **sodium chloride**

6-each element from halogens replaces the elements below it in their salt solutions .

Examples :



For illustration : although fluorine is most active halogen



3-inert gases group (group 18)

Location :

*it is located on the maximum right side of the modern periodic table .

*it is last group in p-block.

*General properties properties of inert gases:

1-they are present in gaseous state .

2-their outermost energy level contain 8 electrons , except helium which contain only 2 electrons {Helium bas only (K) energy level}

3-their valency equal zero GR.

because their outermost energy levels saturated with electrons.

4-they are chemically inactive elements , where they don't react with other elements under normal conditions.

5- they exist in the form of monoatomic molecules (formed of one atom only)

Comparison between main groups in the modern periodic table:

P.O.C	Alkali group	Halogens group	Inert gases group
Group number	(1)1A	(17)7A	(18)0
Block which it belongs to	S-block	P-block	
Valency of its elements	Monovalent		Zero

Properties of elements and their uses

Uses of their compounds in the modern techniques depend on their properties and types .

The following table shows the uses of some elements .

Element	Its uses
sodium $^{23}Na_{11}$ Sodium in a liquid state	It is used a liquid state (as it is a good conductor of heat) in transferring heat from inside the nuclear reactor to outside to be used to obtain the vapour energy required to generate electricity .
Cobalt $^{60}Co_{27}$ Radioactive cobalt 60	It is used in food preservation
Silicon $^{28}Si_{14}$ Silicon	Silicon slides are used in the manufacture of electronic device such as computer and transistor
Nitrogen $^{14}N_{7}$ Liquefied nitrogen	It is used in the preservation of cornea of the eye.

GR: 1- Cobalt ($^{60}Co_{27}$) is used in food preservation

because it radiates(emits) gamma rays, which prevent the reproduction of microbial cells without an effect on human.

2- Silicon slides are used in the manufacture of electronic device such as computer and transistor

Because it is a semi- conductor which its ability to conduct electricity depends on temperature .

3- nitrogen($^{14}N_7$) is used in the preservation of cornea of the eye.

Due to the decrease in its boiling point (-196^o C)

==========

GR:

1-Alkali metals are monovalent elements .

Because they tend to lose the valency electron during the chemical reaction .

2-sodium is kept under the surface of kerosene .

To prevent it from the reaction with moist air as it is an active metal .

3-lithium (^{3} Li) is the least active metal in group (1A) .

Because it has the least atomic size in group (1A) .

4-sodium fires are not put off with water.

Because sodium reacts instantly with water and hydrogen gas evolves which burns with a pop sound .

$2Na + 2H_2O \rightarrow 2NaOH + H_2 \uparrow$

5-Potassium is more active than sodium .

Because the atomic size of Potassium is larger than that of sodium.

6-the reaction of the potassium with water is more strongly than that of sodium.

Because potassium is more active than sodium .

7-elements of group (7A) are known as halogens .

Because they react with metals forming salts . $2K + Br_2 \rightarrow 2KBr$

8- Halogens are monovalent .

Because they tend to gain one electron only during the chemical reaction.

9- halogens exits in the form of diatomic molecules

- halogens do not exist in nature in the elementary state .

Because they are chemically active elements .

10-bromine can't replace chlorine in its salt solution .

Because bromine is less active than chlorine .

What happened when..?

1-passing chlorine gas in potassium bromide solution .

Chlorine replace bromine in its solution .

$Cl_2 + 2KBr \rightarrow 2KCl + 2Br_2$

2- putting a piece of potassium in a beaker containing liquid bromine .

Potassium bromide salt is formed .

$2K + Br_2 \rightarrow 2KBr$

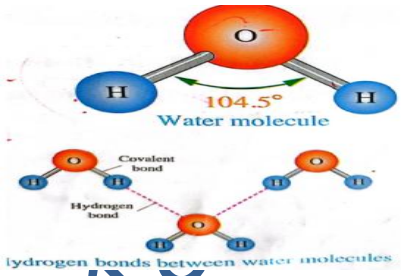
==========

Lesson (4)

Water

Structure of water

Formation of polar water molecule :



*water molecule is formed of one oxygen atom (o) with two hydrogen atoms 2H) joined together by two single covalent bonds ,the angel between them is 104.5^{o}

Bonds between water molecule : hydrogen bond

GR : Bonds between water molecules originate a types of weak electrostatic attraction known as hydrogen bond .

Due to the higher electronegativity of oxygen compared with hydrogen .

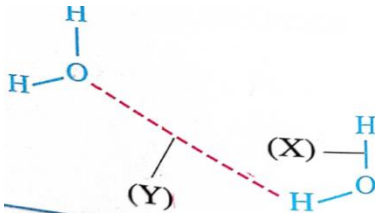
N.B : Bonds between water molecules is covalent bond while bonds between water molecules is hydrogen bond .

hydrogen bond:

It is type of weak electrostatic attraction that originates between the molecules of some polar compounds .

* hydrogen bond between water molecule are weaker than covalent bond between the atoms in the same molecule . however bonds are considered to be the most important factors which are responsible for the abnormality of water properties .

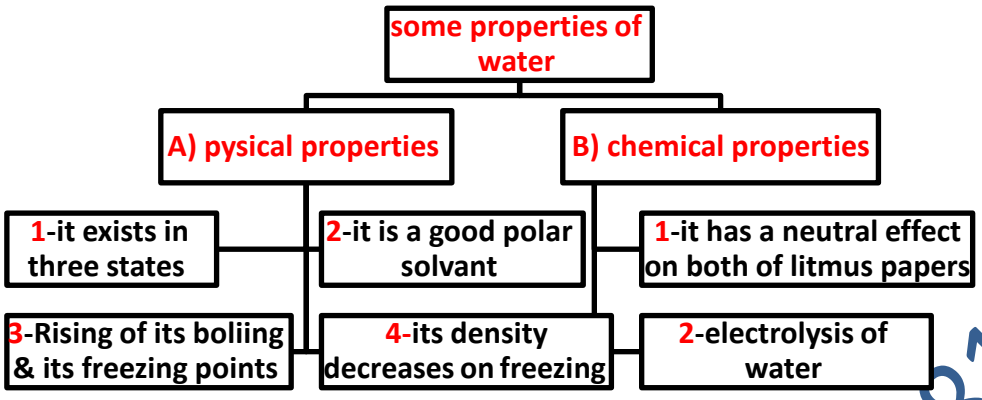
Question: From the opposite figure :



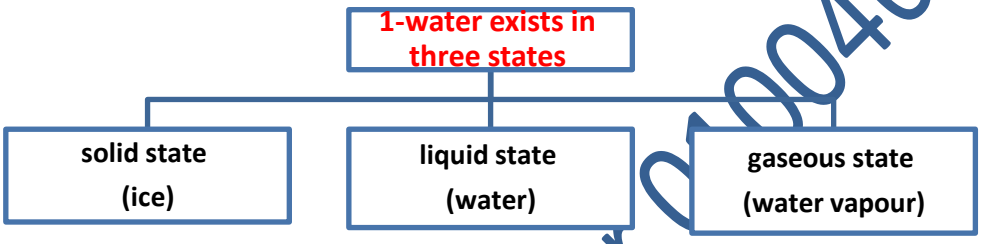
1-what the type of the two bonds (X) and (Y)?

2-which one of them is stronger ?

Properties of water



A) physical properties of water :



2-water is a good polar solvent :

Conclusion:

Water is a good polar solvent for :

1- most ionic compounds (such as sodium chloride) {table salt}

2-some covalent compounds (such as sugar) , which can form hydrogen bond with water .

*most covalent compounds as oil cannot dissolve in water as it cannot form hydrogen bonds with water.

GR: 1-Dissolving of table salt in water.

Because water is a good polar solvent for most ionic compounds (as table salt).

2- Dissolving of sugar in water although it is among covalent compounds.

Because sugar molecules from hydrogen bonds with water molecules.

3-Oil doesn't dissolve in water.

Because it is a covalent compound which cannot from hydrogen bonds with water.

==========

3-Rising of its boliing & its freezing points:

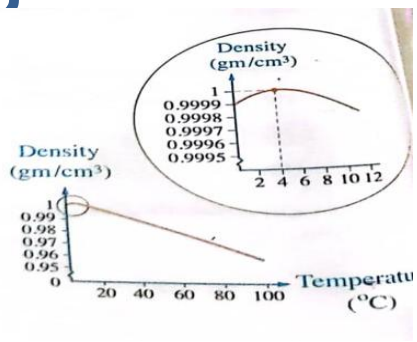
the boiling point	the freezing point
It was supposed that	
the boiling point of water is less than (100°C)	the freezing point of water is less than 0°C
but in the normal atmospheric pressure	
Pure water boils at 100°C.	Pure water freezers at 0°C
due to the presence of hydrogen bonds between its molecules.	

4-water density decreases on freezing

GR : Water is not like other matters, where its density in solid state (ice) is lower than its density in liquid state (water)

because when the a temperature of water becomes less than 4°C , water molecules are collected together by hydrogen bonds forming large-sized hexagonal ice crystals with many spaces between them , so its volume increases and thus its density decreases.

NB: The opposite figure shows the change of water density by changing its temperature , where :



-The highest value of density of pure water at 4°C

-The lowest value of density of pure water at 0°C

GR: 1- ice floats on the water surface

Because the density of ice is less than the density of water

2-although water of oceans freezes at polar zones, the aquatic creatures are still alive .

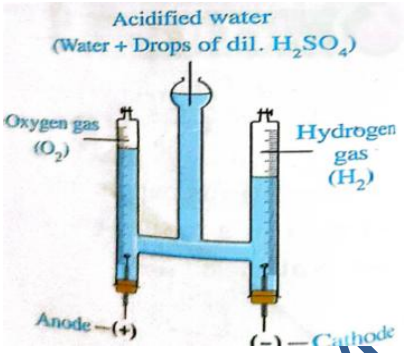
Due to formation of a layer of ice on the surface of liquid water protects the deep water from freezing which preserves the life of the marine organisms in it.

3-on putting a glass bottle completely filled with water in a freezer , it breaks (explodes) .

Because when water freezes , its volume increase .

==========

Chemical properties of water :



1-water has a natural effect on both of litmus papers . [blue and red]

متعادل التأثير علي ورقة عباد الشمس الحمراء تظل حمراء والزرقاء تظل زرقاء

GR: Pure water doesn't affect blue and red litmus papers .

Because pure water has a natural effect on both of litmus papers .

2-Electrolysis of water

*Hydrogen gas evolves at the cathode .

*Oxygen gas evolves at the anode .

==========

N.B :1-Hydrogen gas h_2 [burns with pop sound] . يشعل بفرقعة

2- Oxygen gas O_2 [increase the glow of glowing splint] . يزيد من اشتعال الشظية

3-the volume of h_2 is twice the volume of O_2 . H_2 = 2O_2 volume of hydrogen (at cathode) = 2x volume of oxygen (at anode)

Ratio: 2 : 1

النسبةH_2 : O_2

$$2H_2O \xrightarrow{electrolysis} 2H_2 \uparrow + O_2 \uparrow$$

Used of Hofmann's voltammeter :

Used for the electrolysis of acidified water into hydrogen(at cathode) and oxygen (at anode)

GR:1-Adding few drops of dilute sulphuric acid (or sodium carbonate) to pure water during its electrolysis by Hofmann's voltammeter.

To make water conduct electricity , where the pure water is a bad conductor of electricity.

2-the glowing of splint increases by approaching it to the anode of Hofmann's voltammeter during electrolysis of acidified water .

Because oxygen gas evolves at the anode that increases the glowing of splint.

Exercise : On the electrolysis of a certain volume of acidified water by dilute sulphuric acid , the volume of evolved oxygen gas was 2 cm^3 . what is the volume of evolved hydrogen gas ?

Answer : *the volume of hydrogen gas = 2 x volume of oxygen gas .

* the volume of hydrogen gas = 2 x 2 = 4 cm^3 .

Exercise : On the electrolysis of a certain volume of water , the volume of the gas which burns with a pop sound on approaching a glowing splint to it is 6 cm^3 , what is the volume of the other gas produced from the electrolysis ?

Answer: *the gas which burns with a pop sound is hydrogen.

The volume of oxygen gas = $\frac{\text{the volume of hydrogen gas}}{2} = \frac{6}{2} = 3cm^3$

Water pollution : it is the addition of any substance to the water which causes continuous gradual change in water properties affecting the health and the life of living creatures .

Water pollutants and their harms

Environmental pollutants are divided generally into two kinds, which are:

	Natural pollutants	Artificial pollutants
Sources	Natural phenomena	Different human activates
examples	*Lightning accompanied by thunder storms *death of living organisms *volcanic eruptions.	*the overuse of chemical insecticides and fertilizers. *throwing sewage , factories wastes and leakage of petroleum oil in the seas and rivers. *burning coal and oil , which leads to the formation of acidic rains and smog.

Types of water pollution :

Types of water pollution	Causes (origins)	Harms (damages)
① Biological pollution	Mixing animals and human wastes with water	The infection with many diseases such as : bilharzia, Typhoid and hepatitis .
② Chemical pollution	Discharging factories wastes and sewage in seas ,rivers and canals .	The increase in some elements concentration causing great harms as : 1- the death of brain calls: When eating continuously fish whose bodies contain high concentration of lead 2-blindness :

		When drinking continuously from water high concentration of mercury . 3-cancer : When drinking continuously from water containing arsenic .
③ Thermal pollution	Rising of temperature of some marine zones which use water for cooling the nuclear reactors .	Destroy the marine creatures found in these zones due to the separation of the dissolved oxygen in water
④ Radiant pollution	Dumping the atomic wastes in oceans and seas. Leaking of radioactive materials from nuclear reactors .	For illustration : Increase the infection rates of cancer .

Note: The nuclear reactors cause both thermal water pollution and radiant water pollution .

Protection of water from pollution :

There are many behaviors that must be taken in consideration to protect water from

1-prevention of getting rid of sewage , wastes of factories and dead animals in rivers or canals .

2-Disinfaction of the drinking water tanks which are found on the roofs of buildings in a periodical manner .

3-Don't store the tap water in empty plastic bottle because plastic reacts with chlorine gas (which is in the infection rates of cancer.

4- spreading environmental awareness among people to protect water pollution .

5-Developing the station of water purification and doing a periodical analysis to determine the rate of water validity for drinking .

==========

What happens when.....?

1-putting a glass bottle filled with water in the freezer for a long time .

It will be broken .

2-decrease in water temperature less than $4^{o}c$.

The water molecule are collected together by hydrogen bonds forming large-sized hexagonal ice crystals with many spaces between them so, its volume increases and this its density decreases.

3-water molecule are linked together by hydrogen bonds

The abnormality of water properties such as rising of its boiling and freezing points and decreasing its density on freezing .

4-passing of electric current through Hofmann's voltmeter containing acidified water.

The acidified water decomposes into hydrogen gas evolves at the cathode and oxygen gas evolves at the anode . the ratio between the produced hydrogen gas and oxygen gas is about (2 : 1) by volume respectively.

5-pollution of water with animal and human wastes .

The infection by many diseases such as bilharzia , typhoid and hepatitis.

6-storing water in plastic bottles of mineral water.

Plastic reacts with chlorine gas (which is used as water disinfectant) leading to the increases in the infection rates by cancer.

7-throwing synthetic cleaning substance in water .

This leads to increases the concentration of some elements causing great harms.

==========

Lesson three

The main groups in the modern periodic table

1-Alkali metals group (1A)

-They are located on the left side of the modern periodic table.
- They are the first group of s-block.

General properties of alkali metal:

Physical properties	Chemical properties
1-All of them are solids at ordinary temperature	1-outermost energy level contains only one electron
2-have metallic luster	2-they are monovalent elements
3-they are good conductors of heat and electricity.	3-they are chemically active (kept under surface of kerosene or petrol oil)
4-most of them have low density.	4- Their chemical activity increases as the atomic size increases

2-Halogens group (7A)

-They are located on the right side of the Modern periodic table
-They are elements of group (17) in p-block

General properties:

1-physical properties

1-Bad conductors of heat and electricity
2-Their physical state is graduated from (gas like fluorine and chlorine) (liquid like bromine) (solid like iodine)

2-chemical properties

1-outermost energy level contain 7 electrons.
2-They are mono-valent elements.
3-They are active elements so they don't exist individually in nature.

4- exist in form of diatomic F_2 , Cl_2

5- They react with metals forming salts, so they are called halogens which means "Forming salts".

2K + Br2 ⟶ 2KBr (Potassium bromide)

6-. Each element replaces the element below in its salt solution.

Cl_2 + 2 KBr ⟶ 2 KCl + Br2

3-Inert gases group (18)

-It is located on the maximum right side of the periodic table.
-last group in p-block

General properties of inert gases:

1-they are present in gaseous state.
2-They contain 8 electrons in the outermost energy level except helium which contains 2 electrons.
3-Their valency equal zero.
4-They are chemically inactive.
5-They exist in the form of monoatomic.

Properties of elements and their uses:

1) Sodium ($_{11}$Na):

- It is used in liquid state in transferring heat from inside the nuclear reactor to outside.

2) Cobalt ($_{27}Co^{60}$):

- It is used in food preservation.

3) Silicon ($_{14}$Si):

-It is used in the manufacture of the electronic devices.

4) Liquified nitrogen:

-It is used in preservation of cornea of eye.

Questions (3)

I- Write the scientific term

1. The most active metal. (……..)
2. A gas that is used in cornea preservation. (……..)
3. Non- metal elements do not exist in nature in elementary state (……..)

2- Complete the following

1. ……..is used to transfer the energy from inside the reactor to outside
2. The chemical activity of alkali metal ……..as the ……..increases
3. Lithium and sodium …….on the surface of water as their densities are …….than that of water .
4. Alkaline earth metals react with water to produce ……gas.
5. Metal oxides are called ……..while nonmetals oxides are called……..
6. Valency of group 2 A is ……..while group 7 A is ……..

2- Give reason for :

1- Elements of group (1A) are known as alkali metals
……..

2- Sodium and potassium are kept under the kerosene surface.
……..

3- Group (7A) elements are called Halogens.
……..

4- Rubidium and cesium elements sink in water.
……..

4) What is the importance of:

1. Silicon

……..

2. Sodium

……..…

3. Liquefied Nitrogen

……..……

Lesson four
Water

Hydrogen bond: it is a type of weak electrostatic attraction that originates between the molecules of some polar compound

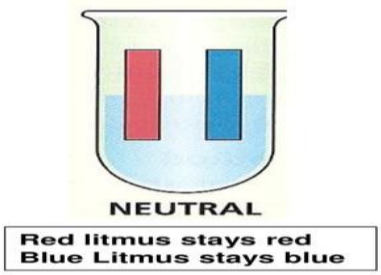
1-Properties of water:

A) Physical properties:

1) Water exists in three states in the normal temperature.
2) Water is good polar solvent.
3)Pure water boils at 100°C and freezes at 0°C .
4)Water density decreases on freezing:

B) Chemical properties:

1) water has a neutral effect on litmus paper.



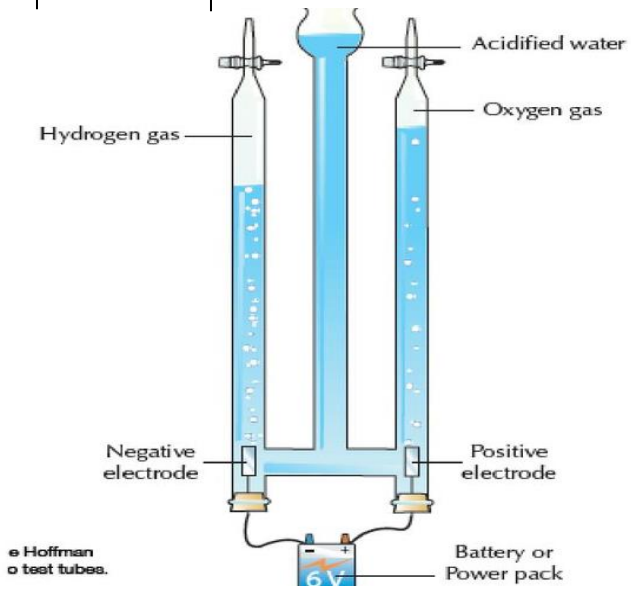
2)Electrolysis of water

Hofmann's voltameter is used for the electrolysis of acidified water

$$H_2O \xrightarrow{\text{(Electrolysis)}} 2H_2\uparrow + O_2\uparrow$$

Volume of hydrogen gas at cathode=

2x volume of oxygen gas at anode



e Hoffman
o test tubes.

Water pollution: It is the addition of any substance to the water which causes continuous gradual change in water properties affecting the health and the life of living creatures.

Water pollutants and their harms:

1- Natural water pollutants: from

*Volcanic eruptions.

*Death of living creatures.

*Lightning accompanying thunder storms

2- Artificial water pollutants:

*overuse of chemical insecticides

*Burning of coal and oil

Types of water pollutants

-Biological pollution

-Chemical pollution

-Thermal pollution

-Radiant pollution

Protection of water from pollution:

1. Preventing of getting rid of sewage, wases of factories and dead animals in rivers and canals.
2. Developing the stations of water purification.
3. Disinfection of drinking water tanks in a periodical manner.
4. Don't store water in empty plastic bottles.

Questions (4)

I-Complete

1. water molecules consist of ……
2. The density of water in ……state is lower than its density in ……..state
3. The hydrogen bond is …….
4.Pure water boils at …… and freezes at ……
5. ……is the positive pole of Hoffman's voltmeter while ……. Is the negative pole.
6. Mixing of animals and human wastes with water causes…… water pollutants while Dumping atomic wastes in ocean causes …… water pollutants.

2) Write the scientific term:

1. A kind of water pollution which results from discharging of factories wastes (……)
2. The bond which links the molecules of water (……)
3. it is a type of weak electrostatic attraction that originates between the molecules of some polar compound (……)

3) Give reason for :

1-Ice floats on water surface.

……

2-Water is important liquid in distinguishing of fires

……

3-Dissolving of sugar in water although it is from covalent compounds.

……

4-The closed glass bottle filled with water is broken when it is put in freezer.

……..

5-Adding drops of dilute acid to water during its electrolysis.

……

4) What's meant by :

1. Hydrogen bond:

……..

2. Water pollution:

……

3. Pollutants:

……

Lesson (3)

"Main Groups in the Modern Periodic Table"

From the main groups in the modern periodic table:

1. Alkali metals group (Group 1A) :

- Group 1A lies in the maximum left of the periodic table, their metals are named alkali metals because they react with water forming alkali solutions.

$$2\,Na + 2\,H_2O \longrightarrow 2NaOH + H_2\uparrow$$

General properties of alkali metals :

-They are mono-valent elements because their outermost shells contain (1) electron.

-They tend to lose their valency electron forming positive ions that carries one positive charge.

-They are chemically active elements so they are kept under kerosene or paraffin to prevent their reaction with the moist air.

-Their chemical activity increases by the increase of atomic size.

"Cesium (Cs) is considered as the most active metal in general."

- They are good conductors of heat and electricity.

-Most of them have low density.

2. Halogens group (7A)

- Group (7A) lies on the right side of the periodic table, it is one of (p) block groups.
- They are salts formations, because they react with metals forming salts.

$$2K + Br_2 \longrightarrow 2KBr$$

Potassium + Bromine ⟶ Potassium bromide

General properties of halogen elements:

-They are mono-valent nonmetals.

-They exist as diatomic molecules F_2 , Cl_2 , ...etc

-They are chemically active elements, so they do not exist individually in nature but they exist in chemical compounds, except astatine which is prepared artificially.

- Each element in the group replaces the element below it in their solutions.

$Cl_2 + 2KBr \longrightarrow 2KCl + Br_2$

Clorine + Potassium bromide ⟶ Potassium chloride + Bromine

$Br_2 + 2KI \longrightarrow 2KBr + I_2$

Bromine + Potassium Iodine ⟶ Potassium bromide + Iodine

-The physical state is graduated from the gaseous state (Fluorine, Chlorine) to the liquid state (Bromine) to solid state (Iodine).

3. Inert gases (group 18)

- It is the last group in p-block

General properties of inert gases:

- They present in gaseous state, they are chemically inactive elements as their outermost energy level saturated by 8 electrons except He which contains 2 electrons.

- The properties of elements and their uses

1-**Sodium** is used in liquid state in transferring heat from inside the nuclear reactor to outside.

2-**Silicon** slides are used in the manufacture of computers because they are semiconductors.

3-**Liquified nitrogen** is used in preservation of the cornea of the eye because it has a low boiling point.

4-**The radioactive cobalt 60** is used in food preservation because gamma rays which come out from it prevent the reproduction of microbial cells without an effect on human.

- **Choose the correct answer :**

1- ..... is considered from halogens.

a- sodium

b- chlorine

c- Helium

d- calcium.

2- .....form positively charged ions when they enter any chemical reaction.

a. inert gases

b. alkali metals

c. Halogens

d. nonmetals.

3- ..... used as semi-conductors in computers.

a- silicon slides

b- cobalt 60

c- liquefied nitrogen

d- sodium

- **Put (√) or (x) in front of each element:**

1- The alkaline metals are good conductors of heat and electricity. (.....)

2- Halogens are monovalent elements. (.....)

3- Iron and copper are inert gases elements . (.....)

4- Chlorine is found in a solid state. (.....)

5- Liquefied Nitrogen is used in preservation of cornea. (.....)

- **Complete the following:**

1 -elements of group (1A) are named as.....and they are from.....block elements.

2-the valence of element in group (7A) is..... As they tend to .....electron.

2- Sodium is kept under the surface of ..... to prevent it from reaction with .....

3- The element of group (17) are called....., while the element of group (18) are called.....

4- $2Na + Cl_2 \longrightarrow$ .....

- **Write the scientific term :**

1- The halogen which exist in a solid state. (.....)

2- An element used to preserve tissue as eye cornea. (.....)

3- A liquid metal acts as a heat conductor in nuclear reactors for generating electricity. (.....)

- **Give reason for:**

- Sodium fires don't put off with water.

.....

-Elements of group (1A) are known as alkali metals.

.....

-Halogens do not exist in the elementary state.

.....

- **Mention some properties for halogens.**

.....

.....

.....

.....

- **Write the balanced chemical equations for the following :**

1- Reaction of sodium with water

.....

2- Reaction of chlorine gas with potassium bromide solution

.....

3- Reaction of bromine with potassium iodide

.....

4- Reaction of chlorine with potassium bromide.

.....

- **Compare between:**

Element of group (1A) and group (7A): Related to (name-valency- kind of formed ion)

	Element of group (1A)	**Element of group (7A)**
name		
valency		
formed ion		
Examples		

Science practicals

Activity 3 "Discovering the chemical properties of alkali"

Substances and Tools:

A piece of sodium	A piece of potassium	Basin	Water

Step 1: Take out a piece of Sodium from the kerosene in which Sodium is kept.

Step 1: Put the sodium carefully in the water basin.

Step 1: repeat the previous steps with Potassium.

Observation:

Why Na and K are kept under kerosene?

.....

.....

Which is stronger in reaction with water Na or K ?

.....

.....

Write your conclusion.

.....

.....

Lesson 4

"Water"

Structure of water molecule:

- Combination of one oxygen atom with two hydrogen atoms by two single covalent bonds, its angle is 104.5
- Water molecules linked together by hydrogen bond as oxygen has higher electronegativity than hydrogen.

Hydrogen bond: it's a weak electrostatic attraction force between the molecules of polar compounds.

Properties of water: A- Physical properties:

1- **State:** solid (ice) – liquid (water) – gaseous (water vapour).

2- **Good polar solvent:**

- Dissolve most ionic compounds as table salt (sodium chloride).
- Dissolve some covalent compounds as sugar as it forms hydrogen bonds with it.
- Can't dissolve some covalent compounds as oil as they can't form hydrogen bonds with water.

3- Pure water boils at 100°C and freezes at 0°C , Due to presence of hydrogen bonds between molecules.

4- Density decreases on freezing as when the temperature of water decreases than 4°C, as water molecules are collected together by hydrogen bonds forming ice crystals which have hexagonal shape, large volume and large number of spaces between them.

- Ice crystals float on the water surface and this helps in the preservation of the life of aquatic creatures.

B- Chemical properties: 1- Water has a neutral effect on litmus paper.

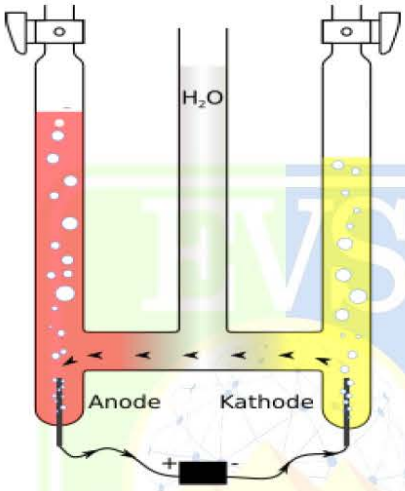
2- Water electrolysis: acidified water decomposes by electricity into:

- Oxygen: evolves at Anode, as oxygen ions are negatively charged which makes more glowing.
- Hydrogen: at Cathode, as hydrogen ions are positively charged and burns with blue flame & pop sound.
- The volume of hydrogen gas evolved is greater than that of oxygen (ratio between them is 2:1).
- Hofmann's voltammeter: used for the electrolysis of acidified water.

- Note: We add drops of dilute sulphuric acid to water during electrolysis as pure water is a bad conductor of electricity.

Activity 4 "Electrolysis of water"

- **Write the name of the following apparatus that is used in Electrolysis of water process.**



……

Observation:

1- What is the ratio between the volume of gas evolved over cathode and the gas evolved over anode?

……

2- Write the names of these two gases, how do you know?

……

3- Why we add a few drops of dilute sulphuric acid to water during its electrolysis by this apparatus?

……

4- Write your conclusion, support your answer with equations

……

- Calculate the volume of the gas evolves at the positive pole if the volume of the gasat the negative pole is 20 cm^3?

……

- **Choose the correct answer:**

1- The volume of hydrogen gas evolving from water electrolysis equals.....the volume of oxygen gas.

a- that of

b- double

c- half

d- four times

2- The type of bond between water molecules is .....bond.

a- metallic

b- ionic

c- hydrogen

d- covalent.

3- The density of pure water in solid state is.....

a- less than its density in liquid state.

b- equal to its density in liquid state.

c- equal to its density in gaseous state.

d- greater than its density in liquid state.

4- In the electrolysis of acidified water by using Hofmann's Voltammeter, the volume of hydrogen gas that evolves is ($40cm^3$) , so the volume of oxygen gas that evolves is .....cm^3

a- 80

b- 40

c- 20

d- 10

5- Increasing the concentration of .....in drinking water causes blindness.

a- lead

b- arsenic

c- mercury

d- chlorine

- **Put (√) or (x) in front of each element:**

1-Hofmann's Voltammeter is used for water ionization. (.....)

2- The pure water has a neutral effect on the litmus paper. (.....)

3- Water and ammonia are from polar compounds. (.....)

- **Complete the following :**

1- There are..... bond in water molecule.

2- The bond between hydrogen atom and oxygen atom in water molecule is .....bond while bonds among water molecules are ..... bonds.

3- Water can dissolve .....compounds that can form .....bonds with water.

4- Water is a good polar .....as it has the ability to dissolve most..... Compound.

5- Increasing the concentration of mercury in drinking water causes .....,while ..... increases the infection rate by liver cancer.

- **Give reason for:**

1- Water is a good polar solvent.

.....

2- Although sugar is a covalent compound, it dissolve in water.

.....

- **What happen when?**

1-Storing water in plastic water.

.....

2-drinking water rich in mercury.

.....

Worksheet 6 lesson 3

[1] – Complete the following:

1 – Elements of group 1 are called ----------and they form------- block.

2 – Sodium and Potassium are kept under the surface of ----------.

To prevent them from the reaction with ----------.

3 - ---------- and ----------elements are examples of alkaline earth metals.

4 – The chemical activity of the elements of group 2 is -------- than that of the alkali metals.

5 – All alkali metals are ----------Conductors of heat and electricity.

6 - 2Na + ---------- ⟶ 2NaOH + -------- ↑

[2] Give reasons:

1 – Chlorine is used in the manufacture of the corrector's substances.

----

2 – Sodium fires don't put off with water.

----

3. Elements of group(1) are known as alkali metals.

----

4. Liquified nitrogen is used in preservation of cornea of the eye.

----

[3] Choose the correct answer:

1. ----------is considered from halogen.

(Sodium - Chlorine - Helium – Calcium)

2. ----------in its salt solution.

(Chlorine replaces bromine – bromine replaces fluorine – iodine replaces chlorine - iodine replaces fluorine)

[4] Mention one use for each of the following elements:

1. Liquid sodium:

---

2. Silicon:

---

3. Cobalt 60:

---

[5] From the figure; Mention the symbols which indicate the following

																N
A												I	K		L	
	C										H					O
B				D			E		F		G	J			M	

1. Inert gases. _____
2. Alkali metals. _____
3. Halogens. _____
4. Alkaline earth metals. _____
5. The most active metal. _____
6. The most active non metal. _____

[6] Write the scientific term:

1 – Monovalent elements which exist in p-block in the modern periodic table. (----------)

2 – The halogen which exists in a liquid state. (----------)

3 – The radioactive elements which is used in food preservation.

(----------)

4 – The metalloids which is used in the manufacture of electronics.

(----------)

5 – The boiling point of liquified nitrogen. (----------)

[7] – Write the chemical equation that illustrate the following:

1 – Reaction of potassium with bromine.

----------.

2 – Passing chlorine gas in potassium bromide solution

----------.

Worksheet 7 Lesson 4

Q1. Complete:

1. Water molecule consists of the combination of one --------- atom with two ---------- atoms to form two single -------- bond.
2. The abnormality of the physical properties of water is due to the presence of ----------bond.
3. 2 H_2O $\xrightarrow{\text{electrolysis}}$ ----------+ ----------
4. From the water pollutants are:
   ----------, ----------, ----------

Q2 Give reasons:

1. The presence of hydrogen bond between water molecules.
   ----
2. Pure water doesn't affect litmus paper.
   ----
3. Although sugar is a covalent compound, it dissolves in water.
   ----
4. The boiling point of water is high.

Q3 Choose from column B the suitable answer from A

A	B
1. Death of brain cells	a. Lead
2. Cancer of liver	b. Sodium
3. Blindness	c. Mercury
	d. Arsenic

Q4. What are the results of:

1. **Water is polluted with the wastes of man and animals.**

   ---

2. **Storing water in plastic bottles of mineral water.**

   ---

3. **Drainage of factories wastes in rivers& seas.**

   ---

4. **Using rivers& seas water for cooling the nuclear reactor.**

Q5 A. Write the chemical equation which illustrates the electrolysis of water.

B. If the volume of evolved oxygen gas at the anode was 2 cm3, what is the volume of hydrogen gas evolved at the cathode.

---

c. Mention the name of the apparatus used in the electrolysis of water.

---

3 - Lesson Three :

1 – Elements of group (18) are known as.....

a. alkali metals
b. halogens
c. nobel gases
d. no correct answer

2 – Hydrogen element belongs to group.....

a. 1A b. 2A c. 6A d. 7A

3 – Elements of group (1A) are known as.....

a. alkali metals
b. halogens
c. nobel gases
d. no correct answer

4 – Alkali metals are considered from.....block groups

a. s b. p c. d d. f

5 - .....is (are) from alkali metals

a. Sodium b. Magnesium c. Rubidium d. (a) and (c)

6 – Which of the following elements is an alkali metal which lies in period 3?...

a. $_{3}Li$ b. $_{12}Mg$ c. $_{11}Na$ d. $_{19}K$

7 – Most of alkali metals have.....density

a. high b. low c. medium d. moderate

8 – All these alkali metals float on water surface except.....

a. Li b. Na c. K d. Cs

9 – At the ordinary temperature, all alkali metals are found in.....state

a. solid b. liquid c. gaseous d. (a) and (b)

10 – The outermost energy level of any alkali metal contains.....electron(s)

a. 1 b. 3 c. 5 d. 7

11 – The valency of alkali metals is.....

a. monovalent b. divalent c. trivalent d. (a) and (c)

12 – All these elements are monovalent except.....

a. $_{11}Na$ b. $_{19}K$ c. $_{20}Ca$ d. $_{3}Li$

13 – Elements which have atomic numbers.....are called alkali metals

a. 2,8,16 b. 2,10,18 c. 3,11,19 d. 4,12,20

14 - .....form positive ions during the chemical reactions

a. Nobel gases
b. Nonmetals
c. Halogens
d. Alkali metals

15 - .....are kept under the surface of kerosene in the lab

a. Alkali metals
b. Halogens
c. Inert gases
d. Alkaline earth metals

16 – Sodium and potassium are kept under the surface of.....

a. water
b. kerosene
c. alcohol
d. benzene

17 – The metallic property of alkali metals increases by increasing their.....

a. electronegativity
b. atomic size
c. valency
d. all are correct

18 - .....element has higher chemical reactivity

a. Sodium b. Potassium c. Lithium d. Cesium

19 – The strongest (most active) metal lies in group.....

a. 7A b. 1B c. 1A d. 2A

20 – The most active metal in group (1A) is.....

a. Na b. Cs c. K d. Li

21 – Elements of group (1A) are dissolved in water forming.....solutions

a. acidic b. basic c. neutral d. red

22 – The gas evolved on reacting alkali metal with water is.....

a. oxygen b. nitrogen c. hydrogen d. helium

23 - .....reacts with water more strongly than sodium

a. Potassium
b. Rubidium
c. Cesium
d. All are correct

24 – All the following are from the properties of alkali metals except they.....

a. have low densities
b. are active elements
c. conduct heat and electricity
d. are divalent elements

25 – Alkali metals have the following properties except.....

a. they have low density
b. they conduct heat
c. they conduct electricity
d. they don't react with water

26 – Rubidium (Rb) element lies in group (1A) and period....in the periodic table

a. 2 b. 3 c. 4 d. 5

27 – Elements of group (7A) are known as.....

a. inert gases
b. halogens
c. alkali metals
d. alkaline earth metals

28 – Halogens are considered from.....block groups

a. s b. p c. d d. f

29 - .....is considered from halogens

a. Na b. Cl c. He d. Ca

30 - .....is (are) from the halogens that exist(s) in a gaseous state

a. Bromine b. Chlorine c. Fluorine d. (b) and (c)

31 – The halogen which exists in a liquid state is.....

a. bromine b. iodine c. fluorine d. chlorine

32 – The halogen which is found in a solid state is.....

a. bromine b. iodine c. fluorine d. chlorine

33 – All of these halogens exist in a gaseous state except.....

a. iodine b. fluorine c. chlorine d. (b) and (c)

34 – Halogens are.....conductors of heat and electricity

a. good b. bad c. moderate d. all of them

35 – The outermost energy level of any halogen contains.....electron(s)

a. 1 b. 3 c. 6 d. 7

36 – The valency of halogens is.....

a. tetravalent b. divalent c. monovalent d. (a) or (b)

37 - .....form negative ions during the chemical reactions

a. inert gases
b. halogens
c. alkali metals
d. alkaline earth metals

38 – The molecule of halogens is composed of.....atom(s)

a. 1 b. 2 c. 3 d. 4

39 – Halogens don't found in an elementary state except.....which is prepared artificially

a. oxygen b. chlorine c. astatine d. iodine

40 – The halogen that can be prepared artificially is.....

a. Cl b. I c. At d. Br

41 – The most active element in group (7A) is.....

a. F b. Cl c. I d. At

42 - .....in its salt solution

a. Chorine replaces bromine
b. Bromine replaces fluorine
c. Iodine replaces chlorine
d. Iodine replaces fluorine

43 – All of these elements can replace bromine in its salt solutions except.....

a. fluorine b. chlorine c. iodine d. (a) and (b)

44 – Bromine is obtained when chlorine reacts with.....solutions

a. sodium bromide
b. potassium bromide
c. sodium iodide
d. (a) or (b)

45 – Liquid sodium is used in.....

a. nuclear reactors
b. computers
c. fridges
d. sterilization

46 – The element which emits gamma rays is.....

a. ^{60}Co b. ^{23}Na c. ^{14}N d. ^{35}Cl

47 - .....rays are used sterilizing food

a. Alpha b. Beta c. Gamma d. Laser

48 – The semi-metal (metalloid) that is used in the manufacture of transistor is....

a. S
b. Si
c. Na
d. K

49 – Cornea is preserved under the surface of.....

a. nitrogen gas
b. liquid paraffin
c. liquefied nitrogen
d. helium gas

50 – The boiling point of liquefied nitrogen is.....

a. 0°C b. 194°C c. -96°C d. -196°C

51 – The valency of nobel gases is.....

a. monovalent b. divalent c. trivalent d. zero

4 – Lesson Four :

1 – Water has several uses in.....

a. agricultural field
b. industrial field
c. personal field
d. all the them

2 – Water molecule is composed of.....

a. one oxygen atom and one hydrogen atom
b. two oxygen atom and one hydrogen atom
c. one oxygen atom and two hydrogen atoms
d. two oxygen atoms and two hydrogen atoms

3 – In water molecule, oxygen atom is linked with two hydrogen atoms by two...

a. ionic
b. single covalent
c. double covalent
d. hydrogen

4 – In water molecule, the angle between the two hydrogen atoms is.....

a. 64°
b. 104.5°
c. 104°
d. 140.5°

5 – The covalent bond in a molecule of water is (are).....bonds(s)

a. one double
b. one triple
c. two single
d. two double

6 – The electronegativity of oxygen is.....than that of hydrogen

a. equal to
b. higher than
c. less than
d. (a) and (b)

7 – There are.....bonds among the water molecules

a. ionic
b. covalent
c. hydrogen
d. (b) and (c)

8 -.....is a weak electrostatic attraction force that arises between the molecules of polar compounds as water and ammonia

a. Hydrogen bond
b. Covalent bond
c. Ionic bond
d. (a) and (b)

9 – Hydrogen bond is.....than covalent bond

a. weaker
b. stronger
c. lighter
d. (a) and (c)

10 - .....is responsible for the unique properties of water

a. Hydrogen bond
b. Covalent bond
c. Ionic bond
d. (a) and (b)

11 – Water exists in.....in normal temperatures

a. solid state only
b. gaseous state only
c. liquid state only
d. all the previous answers

12 – The pure water boils at.....°C

a. 100
b. 37
c. 42
d. 0

13 - The pure water freezes at.....°C

a. 4
b. 100
c. 0
d. 37

14 – The density of pure water.....on freezing

a. increases
b. decreases
c. is doubled
d. remains constant

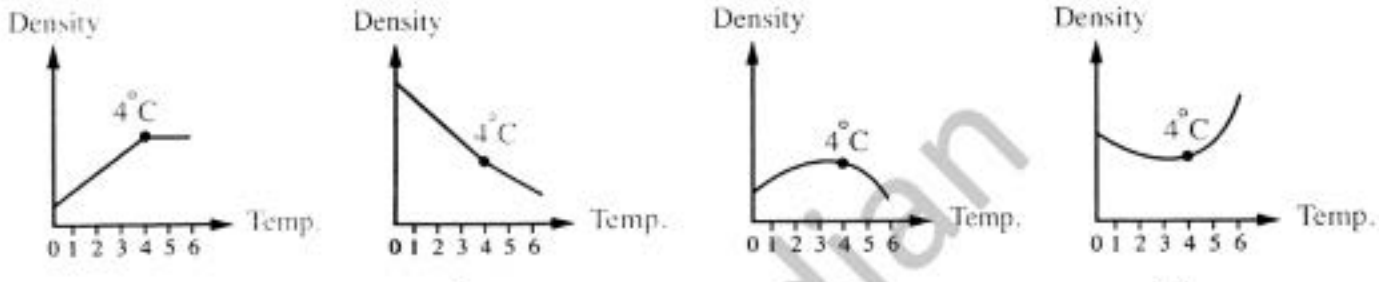
15 – The volume of pure water.....on freezing

a. increases
b. decreases
c. is doubled
d. remains constant

16 – The mass of pure water.....on freezing

a. increases
b. decreases
c. is doubled
d. remains constant

17 – The figure.....represents the change in water density by changing the temperature



a. b. c. d.

18 – The highest value of density of pure water is at.....°C

a. 0 b. 4 c. 100 d. 42

19 – The lowest value of density of pure water is at.....°C

a. 0
b. 4
c. 100
d. 37

20 – The density of pure water in its solid state is.....

a. less than its density in liquid state
b. equal to its density in vapour state
c. greater than its density in liquid state
d. less than its density in vapour state

~~21~~ – The ***ratio*** between the density of water at 4°C to its density at zero °C is.....one

a. more than b. less than c. equal to

~~22~~ – The density of pure water in the solid state is.....1 gm/cm^3

a. more than b. less than c. equal to

23 – The volume of a quantity of water at 10°C is...the volume of the same quantity at 1°C

a. more than b. equal to c. less than

24 – A bottle is filled completely with water and put closed in the freezer.

After sometime, it breaks because when water freezes.....

a. its density becomes less than its volume
b. its volume increases without a change in its density
c. its volume increases and its density decreases
d. its density increases and its volume decreases

25 – When we put 1 litre of water at 4°C in the freezer to change it into ice, its mass.....

a. increases
b. decreases
c. is doubled
d. remains constant

26 – The snow crystals has.....shape

a. octagonal b. pentagonal c. hexagonal d. quadrigonal

27 – Ice crystals are characterized by all the following except they have.....

a. low density
b. high density
c. large volume
d. hexagonal shape

28 – Water has a/an.....effect on litmus paper

a. basic b. neutral c. acidic d. alkaline

29 – Hofmann's voltameter is used in water.....

a. analysis b. electrolysis c. ionization d. acidification

30 – During the electrolysis of water, we add some drops of.....into water

a. dilute HCl
b. conc. HCl
c. dilute H_2SO_4
d. conc. H_2SO_4

31 – During water electrolysis, oxygen gas evolves at the.....

a. anode b. cathode c. (a) or (b)

32 – During water electrolysis, hydrogen gas evolves at the.....

a. anode b. cathode c. (a) or (b)

33 – The volume of hydrogen gas evolves from water electrolysis is.....

a. half of oxygen volume
b. double the oxygen volume
c. equal to the oxygen volume
d. four times oxygen volume

34 – Electrolysis of acidified water gives hydrogen gas and oxygen gas at a ratio of.....

a. 1 : 2
b. 2 : 1
c. 1 : 3
d. 2 : 3

35 – In the electrolysis of acidified water by using Hofmann's voltameter. If the volume of hydrogen gas evolves is 40 Cm^3, so the volume of oxygen gas that evolves is.....cm^3

a. 10 b. 20 c. 40 d. 80

~~36~~ – If the summation of the volume of two evolved gases at the two poles of Hofmann's voltameter is 60 cm^3, so the volume of oxygen and hydrogen gases ***respectively***.....

a. 20 cm^3 – 40 cm^3
b. 40 cm^3 – 20 cm^3
c. 30 cm^3 – 30 cm^3
d. 10 cm^3 – 50 cm^3

37 – A liquid boils at 100°C. What is the other property that confirms that it is pure water?.....

a. It dissolves table sugar
b. Its density decreases on freezing
c. It has a neutral effect on litmus paper
d. It evaporates on heating

38 – All the following among the properties of water except.....

a. it has a neutral effect on litmus paper
b. it is a polar compound
c. its volume increases by freezing
d. it decomposes by heat into elements

39 – All the following are natural water pollutants except.....

a. volcanic eruption
b. death of living organisms
c. lightening accompanied thunder storms
d. discharge of factories residues

40 – Mixing animals and human wastes with water causes.....pollution

a. chemical b. biological c. thermal d. radiant

41 – All the following diseases are caused by biological pollution except.....

a. cancer b. bilharzia c. hepatitis d. typhoid

42 – Increasing the concentration of.....in drinking water causes death of brain cells

a. lead b. mercury c. arsenic

43 – Increasing the concentration of.....in drinking water causes blindness

a. lead b. mercury c. arsenic

44 – Increasing the concentration of.....in drinking water causes liver cancer

a. lead b. mercury c. arsenic

45 - .....pollution causes the death of marine creatures

a. chemical b. thermal c. radiant d. biological

46 – Which of following behaviours causes radiant pollution?.....

a. Leakage of radioactive materials from nuclear reactors
b. Using water in cooling the nuclear reactors
c. (a) and (b) are correct

47 – Putting water in empty glass bottles causing the plastic reacts with.....gas

a. hydrogen b. chlorine c. fluorine d. oxygen

48 – The water of a pool contains minerals, oxygen, organic fertilizers, animal wastes and green algae. What is the number of pollutants found in it?.....

a. 1 b. 2 c. 3 d. 4

November Revision

Mr. Ahmed Elbasha

(1) Write the scientific term:

1) The halogen which exists in a liquid state. .....

2) The apparatus which is used in water electrolysis. .....

3) A bond that exists between water molecules. .....

4) A liquid metal acts as a heat conductor in nuclear reactors for generating electricity. .....

5) The kind of bond which binds oxygen atom with hydrogen atom in water molecule. .....

6) The strongest metal in group (1A) . .....

7) A bond that exists between water molecules. .....

8) Weak electrostatic attraction that arises between the molecules of the polar compounds. .....

9) The halogen which exists in a solid state. .....

10) Adding any substance to the water which changes its properties, affects the health and life of living organisms. .....

11) The apparatus which is used for water electrolysis. .....

12) A charged layer reflects radio waves.

13) The region between stratosphere and mesosphere at which the temperature remains constant.

14) The weight of air column of an atmospheric height above a unit area.

15) **Colored bright curtains seen at the two poles.**

16) **A layer which plays an important role in wireless communications.**

17) **An atmospheric layer at which the air moves vertically.**

18) **An area where the atmospheric envelope is inserted in outer space.**

19) **A device used to measure the elevations above sea level.**

20) **Two magnetic belts surrounding ionosphere and play an important role in scattering harmful charged cosmic radiations.**

✹(2) Choose the right answer:

1.The gas which is evolved on reacting alkali metals with water is .....

a. oxygen. b. nitrogen. c. hydrogen. d. helium.

2.The volume of hydrogen gas evolving from water electrolysis is ..... the volume of oxygen gas .

a. equal to b. twice c. half d. four times

3.Elements of group (1A) are known as .....

a. inert gases. b. alkali metals.

c. halogens. d. alkaline Earth metals.

4..... is a polar compound.

a. Petrol b. Water c. Alcohol

5.The elements of group (7A) are known as .....

a. alkali metals. b. halogens. c. alkaline earth metals.

6.Each period in the periodic table starts with a/an .....

a. metal. b. metalloid. c. nonmetal. d. inert gas.

7..... is considered from halogens.

a. Sodium b. Chlorine c. Helium d. Calcium

8.The density of ice is ..... the density of water.

a. less than b. more than c. equal to

9.Eating fish, which contain high concentration of ..... causes the death of brain cells.

a. mercury b. arsenic c. lead d. iron

10.Ice crystals have ..... shape.

a. tetragonal b. pentagonal c. hexagonal

11.Which of the following is a radioactive element which is used in food preservation ?

a. Liquid sodium. b . Liquefied nitrogen.

c. Cobalt 60. d . Water.

12.Water has high boiling point due to the presence of ..... bonds between its molecules.

a. hydrogen b . ionic c. covalent d . metallic

13.Which of the following is the halogen that exists in a solid state ? .....

a. Fluorine. b. Chlorine. c. Bromine. d. Iodine.

14.When putting a glass bottle completely filled with water in the freezer, it breaks because when water freezes its ..... increases.

a. temperature b. density c. volume d. acidity

15.What is the volume of hydrogen gas evolved from electrolysis of acidified water if you know that the volume of oxygen gas evolved is 2 cm^3 ? .....

a. 1 cm^3. b. 2 cm^3. c . 4 cm^3. d. 6 cm^3

16.When sodium reacts with water ..... gas evolves.

a . N_2 b. O_2 c . H_2

17..... is considered from halogens.

a. Sodium b. Chlorine c . Helium

18.The elements of group (1A) are known as .....

a. alkali metals. b. halogens. c. alkaline Earth metals.

19.Meteors are burnt in .....layer.

a. ionosphere b. stratosphere c. mesosphere d. thermosphere

20.The coldest atmospheric layer is .....

a. troposphere. b. stratosphere. c. mesosphere. d. thermosphere.

21.The first layer in the atmospheric envelope above the sea level is .....

a. mesosphere. b. stratosphere. c. troposphere.

22.Satellites orbit in .....layer.

a. stratosphere b. exosphere c. mesosphere d. thermosphere

23.....is located between stratosphere and mesosphere.

a. Tropopause b. Stratopause c. Mesopause d. Thermopause

24.The normal atmospheric pressure at the sea level equals ..... millibar.

a. 1013.25 b. 76 c. 1.013

25.The air in troposphere layer moves .....

a. horizontally. b. vertically. c . inclined. d. no right answer.

26.The second layer of atmosphere is called .....

a. mesosphere. b. troposphere. c. stratosphere. d. thermosphere.

27.The device that is used for determining the elevation from sea level is .....

a. aneroid . b. altimeter. c. thermometer.

28.The atmospheric pressure on the top of a mountain is ..... the atmospheric pressure at the sea level.

a. more than b. less than c. equal to

29.Luminous meteors are formed in ..... layer.

a. ionosphere b. stratosphere c. exosphere d. mesosphere

✹(3) Complete the following :

1. ..... is an example of polar compounds.
2. Increasing of mercury concentration in drinking water causes .....
3. Fluorine and chlorine exist in ..... state.
4. Eating fish which contains high concentration of lead causes ..... , but drinking water which contains high concentration of mercury leads to .....
5. Alkali metals are good conductors of ..... and .....
6. There are ..... bonds between water molecules.
7. ..... and .....are examples of polar compounds.
8. The valency of alkali metal elements is .....
9. Pure water boils at ..... and freezes at .....
10. Elements in group (1A) are called alkali metals as their elements react with ..... forming .....solutions.
11. Elements of group (1A) are called ..... , but elements of group (7A) are called .....
12. The bond between hydrogen atom and oxygen atom in water molecule is ..... bond, while bonds among water molecules are ..... bonds.
13. Sodium is kept under the surface of . ..... so , as not to react with .....
14. ..... is used in food preservation.
15. Cobalt 60 has the ability to kill .....
16. The strongest nonmetal lies in group .....
17. .....is from the examples of polar compounds because the difference in electronegativity between its elements is relatively .....
18. During the electrolysis of acidified water by Hofmann's voltammeter, the ..... gas evolves at the anode, while the ..... gas evolves at the cathode.

19. Sodium reacts with water to produce .....gas.

20. Elements of group (1A) are called .....

21. There are ..... bonds between molecules of water

22. The angle between water molecules .....

23. The highest temperature layer in the atmosphere is ..... and the least temperature one is .....

24. The height of atmospheric envelope above sea level is ..... km, while the normal atmospheric pressure equals ..... millibar.

25. The thickness of mesosphere layer is about ..... km.

26. The normal atmospheric pressure at the sea level equals ..... mb.

27. The highest temperature layer in the atmosphere is ..... and the lowest temperature one is .....

28. The hottest atmospheric layer is ....., but the coldest atmospheric layer in the atmospheric envelope is .....

29. The thickness of stratosphere is ....., while that of mesosphere is .....

✹(4) Correct the underlined words:

1	Ice crystals have **round** shape	(.....)
2	**Fluorine** is the only liquid halogen.	(.....)
3	**Oil** is a covalent compound dissolves in water.	(.....)
4	Mixing animals and human wastes with water causes **chemical** pollution.	(.....)
5	Eating food containing high percentage of lead causes **blindness**.	(.....)
6	**Hydrogen** used in preserving eye cornea.	(.....)
7	Pure water has **acidic** effect on litmus paper.	(.....)
8	**Sodium** is used in making electronic slides.	(.....)
9	Cobalt 60 is used in preservation of **cornea of eye.**	(.....)
10	When the temperature of water decreases to less than **0°C**, its density decreases and, so it floats on water surface in the form of ice crystals.	(.....)
11	Elements of group 1A are known as **halogens**.	(.....)
12	**Covalent** bond is a weak electrostatic attraction force which arises among water molecules.	(.....)
13	**Aneroid** is an instrument used to determine the elevation of aeroplanes above sea level.	
14	Meteors burn in **thermosphere** layer.	
15	The **thermometer** is an instrument used to measure the atmospheric pressure.	
16	Radio waves are reflected and transmitted by communication centers in **stratosphere**.	
17	All weather phenomena like rains, wind and clouds occur in the **ionosphere**.	

✹(5) Give reason for:

1. Water molecule is from polar compounds.

.....

2. Dissolving of sugar in water although it is among covalent compounds.

.....

3. Water has high boiling point.

.....

4. Bromine cannot replace chlorine in sodium chloride.

.....

5. Silicon slides are used in making electronics as computers .

.....

6. Sugar dissolves in water.

.....

7. Liquefied nitrogen is used in preservation of the eye cornea.

.....

8. Cobalt 60 is used in food preservation.

.....

9. Water density decreases on freezing.

.....

10. Chlorine replaces bromine in potassium bromide solution.

.....

11. Adding drops of dilute acid to water during its electrolysis.

.....

12. Van-Allen belts play an important role in atmosphere.

.....

13. The lower part of stratosphere is suitable for flying aeroplanes.

.....

✹(6) What happen if:

1. Storing drinking water in plastic bottles.

.....

2. Eating fish contains high concentration of lead.

.....

3. passage of electricity in Hofmann's voltammeter containing acidic water.

.....

4. The pollution of water with animals and human wastes.

.....

5. Decreasing water temperature to less than 4°C.

.....

6. There is no ionosphere layer at the end of thermosphere.

.....

✹(7) Put (√) or (X) :

1. Silicon slides are good conductors of electricity. ( )
2. Ice crystals have pentagonal shapes. ( )
3. Halogens are monovalent elements. ( )
4. Water and ammonia are non-polar compounds. ( )
5. Liquefied sodium is used in preservation of cornea of the eye. ( )
6. Halogens are from monovalent metals. ( )
7. Water and ammonia are from polar compounds. ( )
8. Water molecules are linked together by ionic bond. ( )
9. Hydrogen evolves at positive pole in Hofmann's voltameter. ( )
10. Density of ice is more than that of water. ( )
11. The air moves vertically in the bottom part of the stratosphere. ( )
12. The troposphere is the first layer in the atmospheric envelope. ( )
13. The millibar is the unit of measuring the ozone degree. ( )
14. Mesosphere is the layer which is responsible for burning of meteors. ( )
15. Altimeter is a kind of barometers. ( )
16. The satellites revolve around the Earth in a region called the troposphere. ( )
17. Meteors are burnt in thermosphere layer. ( )
18. The pilots prefer to fly in mesosphere. ( )

✹(8) Write the balanced chemical equations which express the following reactions :

1. Bromine with potassium iodide.
   .....
2. Decomposition of acidified water by electricity into two elements hydrogen and oxygen.
   .....
3. Reaction of chlorine gas with potassium bromide solution.
   .....
4. Potassium iodide with bromine.
   .....

✹(9) Problems

1

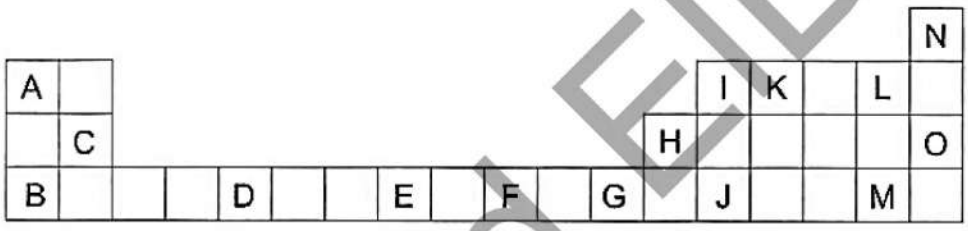
Choose from column (B) what suits it in column (A) :

(A) Harms	(B) Pollutant
1. Death of brain cells. 2. Liver cancer. 3. Blindness.	a. lead. b. sodium. c. mercury. d. arsenic.

1- 2- 3-

2

Study the following figure which represents a section of the periodic table, then answer :



[NB. The letters in the table don't represent the actual symbols of the elements]

Write the symbol(s) which indicate(s) :

a. Halogens.

b. Inert gases.

c. The most active metal.

d. Transition elements.

3

Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Liquid sodium 2. Liquefied nitrogen 3. Cobalt 60 4. Silicon slides	a. is used in preservation of food. b. is used in manufacture of electronic devices. c. is used in nuclear reactors. d. is used in preservation of cornea of the eye.

1- 2- 3- 4-

4

Calculate the temperature at the top of a mountain, which its height is 4 km. If the temperature at the base of that mountain is 24°C.

.....

.....

.....

.....

.....

5

If the temperature at the sea level is 20.6°C. Find the temperature at the top of a mountain of height 2 km above Earth's surface.

.....

.....

.....

.....

Model Answer

✹ (1) Write the scientific term:

1. Bromine
2. Hofmann voltmeter
3. Hydrogen bond
4. Sodium
5. Single covalent bond
6. Cesium
7. Hydrogen bond
8. Hydrogen bond
9. Iodine
10. Water pollution
11. Hofmann voltmeter
12. Ionosphere
13. Stratopause
14. Atmospheric pressure
15. Aurora phenomenon
16. Ionosphere
17. Troposphere
18. Exosphere
19. Altimeter
20. Van Allen belt

✹(2) Choose the right answer:

1. C	6. A	11. C	16. C	21. C	26. C
2. B	7. B	12. A	17. B	22. B	27. B
3. B	8. A	13. D	18. A	23. B	28. B
4. B	9. C	14. C	19. C	24. A	29. D
5. B	10. C	15. C	20. C	25. B	

✹(3) Complete the following :

1. Water
2. Blindness
3. Gas
4. Death of brain cells - Blindness
5. Heat – electricity
6. Hydrogen
7. Water – ammonia
8. Monovalent
9. 100°C – 0°C.
10. Water – alkaline
11. Alkali metals – halogen
12. Single covalent bond – hydrogen
13. Kerosene – air
14. Cobalt 60
15. Microbes
16. 7A
17. Water – high
18. Oxygen – hydrogen
19. Hydrogen
20. Alkali metals
21. Hydrogen
22. 104.5°
23. Thermosphere – mesosphere
24. 1000 - 1013.25
25. 35
26. 1013.25
27. Thermosphere – mesosphere
28. Thermosphere – mesosphere
29. 37 – 35

✹(4) Correct the underlined words:

1. Hexagonal
2. Bromine
3. Sugar
4. Biological
5. Death of brain cells
6. Liquefied nitrogen
7. Neutral
8. Silicon
9. Food
10. 4°C.
11. Alkali metals
12. Hydrogen
13. Altimeter
14. Mesosphere
15. Barometer
16. Ionosphere
17. Troposphere

✹(5) Give reason for:

1- Because of the electronegativity difference between its elements is relatively high
2- Because sugar forms a hydrogen bond with water.
3- Due to the presence of hydrogen bonds between water molecules
4- Because bromine is less active than chlorine
5- Because it is semi-conductor
6- Because sugar forms a hydrogen bond with water
7- Due to the decrease of its boiling point.
8- Because it radiates (produces) gamma rays which prevent the reproduction of microbes
9- Because it's volume increase
10- Because it is more active than bromine
11- Because pure water is bad conductor of electricity
12- Because these two belts play an important role in dispersing harmful charged cosmic radiation away from the Earth
13- Because it doesn't contain clouds or suffer from any weather disturbances and the air moves in this part horizontally

✹(6) What happen if:

1. Plastic will react with chlorine gas leading to the increase in the infection rates by cancer
2. It causes the death of brain cells.
3. **1. Acidified water decomposes by electricity into:**
   Oxygen gas evolves at the anode (because oxygen ions are negative)
   Hydrogen gas evolves at the cathode (because hydrogen ions are positive)
   2- The volume of hydrogen is twice the volume of oxygen.
   Because water molecule H2O is composed of two hydrogen atoms and one oxygen atom
   $H2O \xrightarrow{\text{electrolysis}} O2 + H2$
4. It causes many diseases such as: Bilharzia, typhoid and hepatitis.
5. Water molecules are collected and form crystal of hexagonal shape
6. We can't make wireless communications and broadcasting

✹(7) Put (√) or (X) :

1. (√)	**4.** (X)	**7.** (√)	**10.** (X)	**13.** (X)	**16.** (X)
2. (X)	**5.** (X)	**8.** (X)	**11.** (X)	**14.** (√)	**17.** (X)
3. (√)	**6.** (X)	**9.** (X)	**12.** (√)	**15.** (√)	**18.** (X)

✹(8) Write the balanced chemical equations which express the following reactions :

1- $Br_2 + 2KI \rightarrow 2KBr + I_2$
2- $2H_2O \rightarrow 2H_2 + O_2$
3- $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$
4- $Br_2 + 2KI \rightarrow 2KBr + I_2$

✹(9) Problems

1	1. a 2. d 3. c	4	– The temp. at the top of the mountain = the temp. at its base – the decrease in temp. = 24 – (4 × 6.5) = 24 – 26 = – 2°C
2	a. L and M b. N and O c. B d. D , E , F and G	5	- The temp. at the top of the mountain = the temp. at sea level – the decrease in temp. = 20.6 – (2 × 6.5) = 20.6 – 13 = 7.6°C
3	1. c 2. d 3. a 4. b	6	

Question 1

Choose the correct answer:

1. **There are …….. bonds among water molecules.**
   a. hydrogen b. covalent
   c. ionic d. metallic
2. **Alkali metals are considered from …… block groups.**
   a. s b. p c. d d. f
3. **Elements of group (1A) react with water forming ……. solutions.**
   a. acidic b. alkaline c. neutral d. (a) and (c)
4. **Hydrogen element belongs to ……..**
   a. group (1A). b. group (2A). c. group (6A). d. group (7A).
5. **The gas evolved on reacting alkali metal with water is …….**
   a. oxygen. b. nitrogen. c. hydrogen. d. helium.
6. **Most alkali metals have…… density.**
   a. low b. high c. the same d. zero
7. **All these alkali metals float on water surface except ……..**
   a. potassium. b. lithium. c. sodium. d. cesium.
8. **All of the following are among the properties of water except**
   a. it has a neutral effect on both of litmus paper.
   b. it is a polar compound.
   c. its volume increases by freezing.
   d. it decomposes by heat into its elements.
9. **Elements of group (7A) are known as ……**
   a. inert gases. b. alkali metals c. halogens. d. metalloids.
10. **In a water molecule, oxygen atom combines with two atoms hydrogen atom by two ..... bonds**
    a. double covalent b. single covalent
    c. ionic d. hydrogen
11. **the angle between the two single covalent bonds is……**
    a. 64° b. 104°
    c. 104.5° d.140.5°

12. Alkali metals locate in group ……..

a. 7A b. 1 A c. 1B d. 2A

13. On the electrolysis of acidified water by using Hofmann's voltammeter, the ratio between the volume of the evolved gas at the positive pole to the volume of the evolved gas at the negative pole is respectively.

a. 1 : 2 b. 1 : 1 c. 2 : 1 d. 3 : 1

14. the volume of hydrogen gas that evolves is (16 cm^3), so the volume of oxygen gas that evolves is ……cm^3

a.16 b. 6 c. 8 d. 10

15. The volume of hydrogen gas evolving from acidified water electrolysis equals ……the oxygen volume.

a. that of b. twice c. half d. four times

16. All of the following are from substances that dissolve in water except……

a. magnesium oxide. b. food oil.

c. sodium chloride. d. sugar.

17. The high boiling point of water is due to the presence of bonds between its …….. molecules.

a. single covalent b. hydrogen

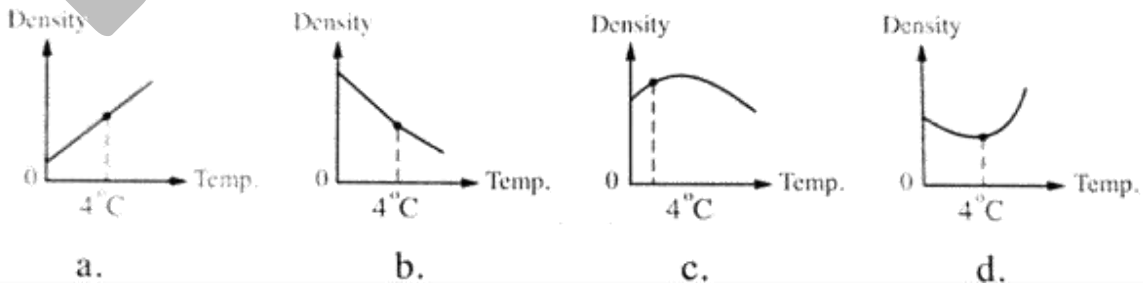
c. double covalent d. ionic

18. The snow crystal has …… shape.

a. octagonal b. quadrilateral

c. pentagonal d. hexagonal

19. The figure ……..represents the change in water density by changing the temperature.



20. Ice crystals are characterized by all the following except they have……..

a. lower density than that of liquid water.
b. large volume.
c. hexagonal shape.
d. higher density than that of liquid water.

21. ……form positive ions during chemical reactions.

a. Nobel gases b. Nonmetals c. Halogens d. Alkali metals

22. All of the following are from the properties of alkali metals, except they……

a. have low densities b. are divalent elements.
c. conduct heat and electricity d. are active elements.

23. Which of the following elements has……. the highest chemical activity

a. Sodium. b. Lithium. c. Potassium. d. Cesium.

24. The strongest metal lies in group…….

a. 7A b. 1B c. 1 A d. 2A

25. Which of the following behaviors causes radiant water pollution?

a. Discharging of sewage in seas.
b. Leakage of radioactive materials from nuclear reactor.
c. Discharging factories residues and chemicals in seas.
d. Mixing animals and human wastes with water.

Question 2

Write the scientific term of each of the following

1. The group which is located on the maximum left side of the periodic table.
2. Elements of group (1A) in the modern periodic table.
3. A water pollutant which causes the death of brain cells.
4. The most active metal in the periodic table.

5. The group which is located on the right side of the periodic table before group zero.
6. A molecule that consists of two hydrogen atoms and one oxygen atom.
7. A kind of water pollution, which arises from mixing animal and human wastes with water.
8. The gas which makes the glowing splint more glowing.
9. The kind of ions which are formed by alkali metals during chemical reactions.
10. A kind of bonds, which arises between oxygen atom and each of hydrogen atoms in water molecule.
11. A type of bond which is responsible for the abnormal properties of water.
12. The radioactive element, which is used in food preservation.
13. A kind of environmental pollutants, which arises from different human activities.
14. A water pollutant which causes blindness when its concentration increases in water.
15. A water pollutant which increases the infection rate by liver cancer.
16. The negative pole in Hofmann's voltammeter.
17. The gas which burns with a pop sound by using a glowing splint.
18. A kind of water pollution which arises from the discharge factories wastes and sewage in seas and rivers.
19. A type of water pollution that results from the increase in the temperature of water which is used in cooling nuclear reactors.
20. A kind of water pollution, which results from dumping atomic wastes in the oceans and seas.
21. Monovalent elements exist in p-block in the periodic table.
22. A type of weak electrostatic attraction which arises among molecules of some polar compounds.
23. The halogen which exists in a solid state.

24. The addition of any substance to water, which causes continuous gradual change in water properties affecting the health and life of living creatures.

25. The metal which is used in a liquid state in transferring heat from inside the nuclear reactor to outside.

26. The nonmetal which is used in preservation of cornea of the eye.

Question 3

Complete the following sentences:

1. Elements of group (I A) are named as…… and they are among……..block element, react with water forming …….solution

2. The valency of alkali metal elements is ……

3. During chemical reaction, an alkali metal loses one electron and changes into…….ion which carries…….positive charge.

4. All alkali metals are good conductors of……and ……

5. Lithium and sodium……on the surface of water as their densities are …… than water density.

6. Mixing animals and human wastes with water causes ……. water pollution, while……dumping the atomic wastes in oceans causes……. water pollution

7. Water is used in many fields such as ……,……and……

8. The high boiling point of water is due to the presence of ……

9. When the temperature of water becomes less than 4°C , its density……

10. When the temperature of water decreases below 4 ° C its molecules are collected together by ……bonds forming ice crystals

11. Ice crystals have …….shape

12. Water has…….. effect on both of litmus paper .

13. …… is an apparatus which is used for the electrolysis of water by using ……energy

14. In Hofmann's voltammeter, the positive pole is called…… .

15. During the electrolysis of acidified water by Hofmann's voltammeter ……. gas evolves at the anode, while ……gas evolves at the cathode.

16. If the volume of the evolved gas at the anode in Hofmann's voltammeter is 7 cm^3 therefore the volume of the evolved gas at the cathode is ……and it is …… gas

17. The bond between hydrogen atom and oxygen atom in water molecule is ..... while bonds among water molecules are ……..bonds.

18. The reaction of potassium with water is ……. than the reaction of sodium with water as potassium is ……..active than sodium.

19. Elements of group (7 A) are named as……..and they are among……..block element, react with water forming …….solution

Question 4

Give reasons for:

1. The abnormality of water properties
2. The presence of hydrogen bonds between water molecules.
3. Oil doesn't dissolve in water.
4. The use of radioactive cobalt 60 in food preservation.
5. The density of water in solid state is less than that its density in liquid state.
6. Cesium is the most active alkali metal in the periodic table.
7. Although water of oceans freezes at polar zones, the aquatic creatures are still alive.
8. Silicon slides are used in the manufacture of electronic devices.
9. Adding few drops of dilute sulphuric acid to pure water during its electrolysis by Hofmann's voltammeter
10. It is dangerous to eat fish containing high concentration of lead
11. Thermal pollution of water leads to the death of marine creatures

12. The reaction of potassium with water is more strongly than the reaction of sodium with water.
13. Elements of group (7A) are known as halogens.
14. Bromine can't replace chlorine in its salt solution.
15. Water has the ability to dissolve most ionic compounds.
16. Although sugar is a covalent compound, it dissolves in water.
17. Both alkali metals and halogens are monovalent elements,
18. The liquid sodium is used in nuclear reactors.

Question 5

Write the balanced chemical equations that illustrate the following reaction:

1. Reaction of sodium with water.
2. Reaction of potassium with water.
3. Reaction of sodium with chlorine.
4. Electrolysis of water
5. Reaction of potassium with bromine.
6. Effect of bromine on sodium iodide solution.
7. Reaction of chlorine gas with potassium bromide solution.

Question 6

a. You have three elements X , Y and Z, their atomic numbers are 10,9 and 3 respectively.

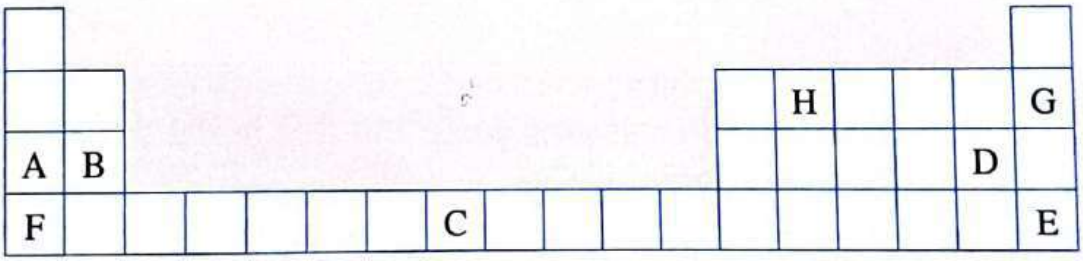
Which of these elements belongs to :

1. Inert gases group. 2. Alkali metals group. 3. Halogens group.

b. Which of the following three elements : (11X), (17Y), (14Z).

1. Can replace iodine in potassium iodide solution.
2. Reacts with water strongly with releasing heat.
3. Enters in formation of a compound which its solution turns violet litmus solution into blue.
4. Enters in the manufacture of electronic slides.
5. Form a salt when reacting together. **(Choose two elements).**

c. Some elements in the periodic table are represented by the letters from A to H and are included in the simplified table as shown below :



I. Choose the letter(s), which indicates:

(a) A halogen. (b) The higher active metal.

2. Write the chemical equation, which represents the reaction of water with element "A".

3. Complete:

(a) The molecule of element (D) consists of……

(b) The valency of element (F) is ……. and that of element D is ……

4. What is the type of the oxide of element (A) ?

5. Why does not element (D) exist in a single state in nature ? And what is its physical state in normal temperature?

d. From the opposite figure, answer the following questions:

1. What is the name of this apparatus ?

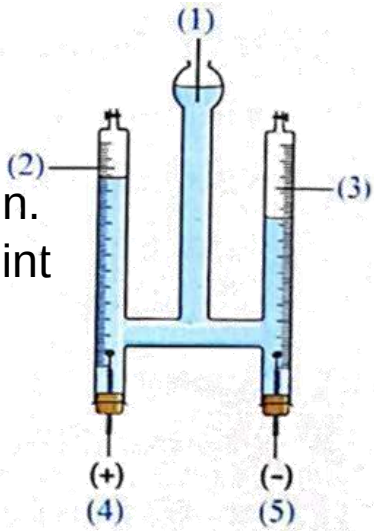
2. What is its importance ?

3. Label the numbers (1) , (2) , (3) , (4) and (5).

4. Write the balanced chemical equation of this reaction.

5. After opening the tap, what happens if a glowing splint is put above the anode and above the cathode ?

6. Calculate the volume of the gas that evolves at the anode if the volume of the gas that evolves at the cathode is 20 cm^3



Answers

Question 1

1. a	**2.** a	**3.** b	**4.** a
5. c	**6.** a	**7.** d	**8.** d
9. c	**10.** b	**11.** c	**12.** b
13. a	**14.** c	**15.** b	**16.** b
17. b	**18.** d	**19.** c	**20.** d
21. d	**22.** b	**23.** d	**24.** c
25. b			

Question 2

Write the scientific term of each of the following

1. 1A
2. Alkali meatal
3. Lead
4. Cesium
5. 7A
6. Water
7. Biological water pollution
8. Oxygen gas
9. Positive ion
10. Single covalent bond
11. Hydrogen bond
12. Cobalt 60
13. Artificial environmental pollution
14. Mercury
15. Arsenic
16. Cathode
17. Hydrogen gas
18. Chemical water pollution
19. Thermal water pollution
20. Radiant water pollution
21. Halogens
22. Hydrogen bond
23. Iodine
24. Water pollution
25. Sodium
26. Liquefied nitrogen

Question 3

Complete the following sentences:

1. alkali metals – s – alkaline solution
2. monovalent.
3. positive - one
4. . heat - electricity.
5. float – smaller
6. biological thermal – radiant
7. agricultural fields - industrial fields personal fields .
8. hydrogen bond

9. decreases
10. hydrogen bond
11. hexagonal
12. neutral
13. Hofmann's voltmeter – electric
14. Anode
15. oxygen – hydrogen
16. 14- hydrogen
17. Single covalent bond – hydrogen bond
18. stronger – more
19. Halogens – p -acidic solution

Question 4

Give reasons for:

1. Due to the presence of hydrogen bonds between water molecules
2. Due to the higher electronegativity of oxygen compared with hydrogen
3. Because it is a covalent compound which cannot form hydrogen bonds with water
4. Because it emits gamma rays which prevent the reproduction of microbial cells without an effect on human
5. Because when the temperature of water becomes less than 4 ° C, water molecules are collected together by hydrogen bonds forming large - sized hexagonal ice crystals with many spaces between them , so its volume increases and thus its density decreases .
6. Because it has the largest atomic size , so it can lose its valency electron easily
7. Due to formation of a layer of ice on the surface of liquid water protects the deep water from freezing which preserves the life of the marine organisms in it.
8. Because it is a semi - conductor which its ability to conduct electricity depends on temperature
9. To make water conduct electricity, where pure water is a bad conductor of electricity
10. Because this leads to death of brain cells.
11. Because this leads to the separation of the dissolved oxygen in water.
12. Because potassium is more chemically active than sodium, where the atomic size of potassium is greater than the atomic size of sodium.
13. Because they react with metals forming salts.
14. Because bromine is less active than chlorine
15. Because water is a good polar solvent.
16. Because sugar molecules can form hydrogen bonds with water molecules.

17. Because alkali metals lose one electron during the chemical reaction and converted into positive ions and halogens gain one electron during the chemical reaction and converted into negative ions

18. Because it is a good conductor of heat, where it transfers heat from inside the nuclear reactor to outside, This heat is used to obtain the vapour energy required to generate electricity.

Question 5

Write the balanced chemical equations that illustrate the following reaction

1. $2Na + 2H_2O \longrightarrow 2NaOH + H_2\uparrow$
2. $2K + 2H_2O \longrightarrow 2KOH + H_2\uparrow$
3. $2Na + Cl_2 \longrightarrow 2NaCl$
4. $2H_2O \xrightarrow{\text{Electrolysi}} 2H_2\uparrow + O_2\uparrow$
5. $2K + Br_2 \longrightarrow 2KBr$
6. $Br_2 + 2KI \longrightarrow 2KBr + I_2$
7. $Cl_2 + 2KBr \longrightarrow 2KCl + Br_2$

Question 5

a. 1. X 2. Z 3. Y

b.

1. Y17
2. X11
3. X11
4. Z14
5. X11, Y17

c. 1. (a) D (b) F

2. Letter " A " represents element " Na " so , the chemical equation of reaction of (Na) with water is

$2Na + 2H_2O \longrightarrow 2NaOH + H_2\uparrow$

3. (a) two atoms . (b) monovalent - monovalent .

4. As **A** is alkali metal group so , the type of oxide is " Basic oxide " .

5. Because element **D** is a halogen which has 7 electron in the outermost energy level so, it needs for one electron to reach to stability form so it is found in diatomic state .
Letter **D** refers to element **Cl** so , its physical state is gas

d.

1. Hofmann's voltammeter
2. It is used for electrolysis of water to its elements
3. (1) Acidified water (2) Oxygen gas (3) Hydrogen gas
   (4) Anode . (5) Cathode .
4. $2H_2O \xrightarrow{\text{Electrolysis}} 2H_2\uparrow + O_2\uparrow$
5. Above the anode: it glows more .
   Above the cathode: it burns with a pop sound .
6. The volume of oxygen gas is 10 cm^3